AUGUST
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IRE
D WIRE PRODUCTS

AIR COOLED
-inside
and outside

MORGAN
CONSTRUCTION CO.
ORCESTER, MASSACHUSETTS

MORGAN
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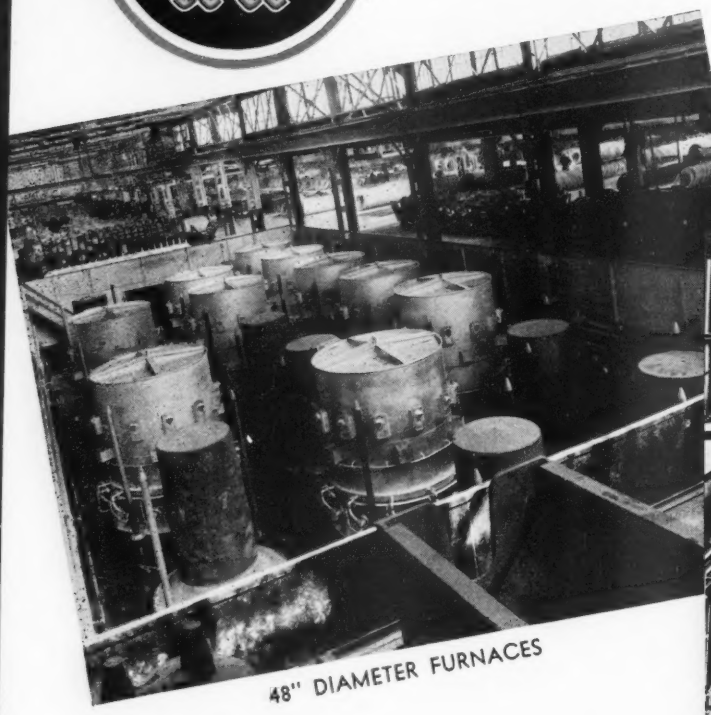
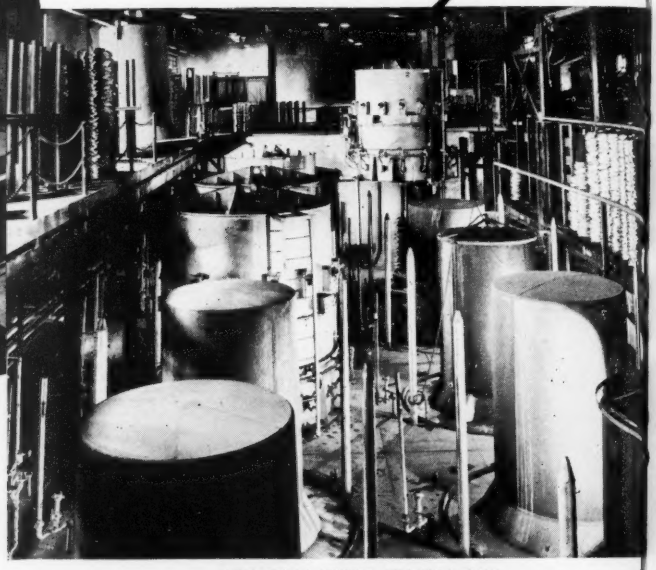
WIRE MACHINES

WILSON Wire and Rod Annealing FURNACES

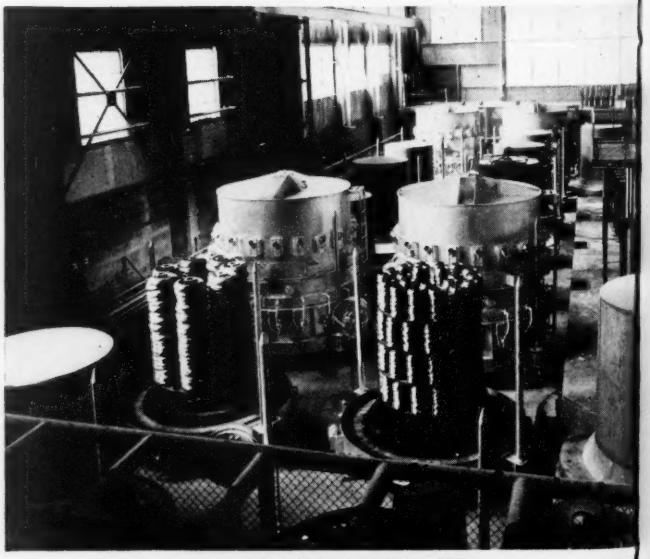


48" DIAMETER FURNACES



62" DIAMETER FURNACES

HERE are three of the largest installations of Wilson Wire Annealing Equipment in the American wire industry — 48" diameter furnaces for rod coils and 62" and 74" diameter furnaces for process and bright annealing. There are many single unit installations also. All are carefully engineered to suit the best needs of the particular plant.



74" DIAMETER FURNACES

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Lee Wilson

ENGINEERING Co., Inc.

20005 WEST LAKE ROAD • CLEVELAND, OHIO

Telephone ACademy 1-4670

RADIANT TUBE HEATING + HEAT TREATING PROCESS

CARBOLOY flat wire rolls outlast steel 48–1

—large eastern mill reports

Setup time reduced 6 to 1; more uniform wire produced with superior finish

Think of it!—In a large eastern rolling mill, 6" flat wire rolls of Carboloy cemented carbide have been in use over one year, 24 hours per day, 5 days per week—and it has not been necessary to regrind them to date.

Here are more benefits

You'll find these other production figures interesting, too. Look at this:

- **Spot changes,** twice a week with steel, now only every six months—outlasting steel at a ratio of 48 to 1.
- **Setup time** cut from two hours every month with steel rolls to two hours every six months with Carboloy.

Carboloy has brought increased production, longer roll life and lowered manufacturing costs to this eastern mill. Rolling high and low carbon steel wire for bobby pins, stitch and spring wire and similar products, they *know* Carboloy rolls are good.

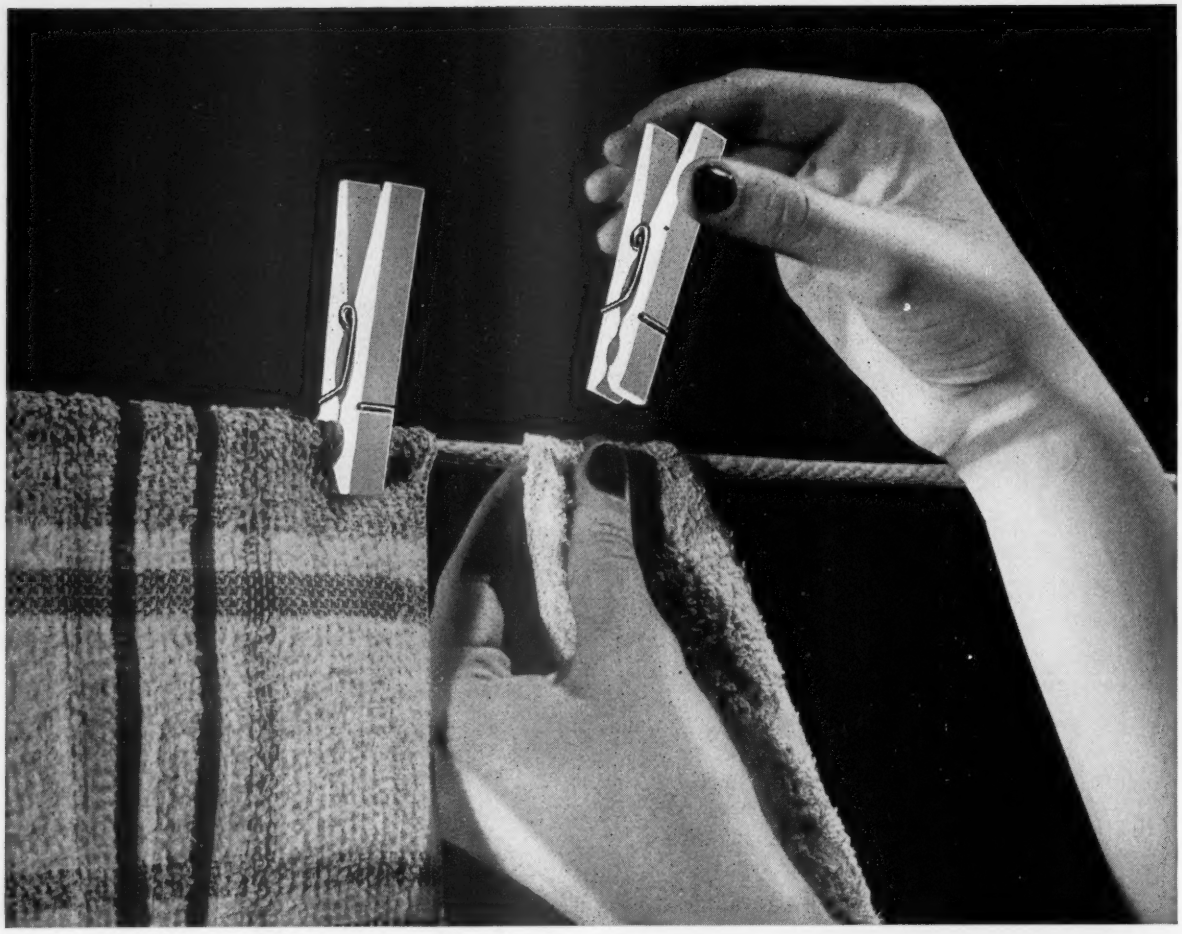
Why not find out for yourself how much good, savings-wise, Carboloy flat wire rolls can do in your mill. Write today for further information. Carboloy Company, Inc., 11171 E. 8 Mile Street, Detroit 32, Michigan.

With Carboloy, you'll get all these advantages in your flat roll operations:

- **Less down time for spot changes and setup**
- **Longer roll life**
- **Better product finish**
- **Less regrinding down time**
- **Increased production**

CARBOLOY®

CEMENTED CARBIDE



Little fellows with a BIG GRIP

Handy gadgets, those pincer-type clothespins. They're so easy to apply; and they hold fast with such tenacity. The "works" of these popular clothespins is a simple spring of galvanized steel wire.

Bethlehem makes many tons of clothespin wire each year for this specialized use. Exacting requirements must be observed in analysis, tensile strength, size, and coating. One of the tests, for example, requires this kind of wire to withstand wrapping around its own diameter without flaking, cracking or peeling of the galvanized coating. Since housewives won't stand for rust stains on their wash, the wire we supply has a high-quality coating of zinc—one that gives long, faithful protection against rust and corrosion.

In our modern wire mills we make just about every kind of steel wire. Some are general-purpose grades; others are tailor-made for a single application. And while there's no such thing as perfection in making steel, our wire customers can back up our assertion that we bat pretty close to 1.000. If you're interested in discussing steel wire, we'll gladly arrange for one of our experienced engineers to visit you.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation.

BETHLEHEM WIRE ★ BETHLEHEM STEEL ★

WIRE & WIRE PRODUCTS, Vol. 25, No. 8, August, 1950. Publication Office at One Sherman Ave., Jersey City, N. J. Executive Office 300 Main Street, Stamford, Conn. Published monthly by the Quinn-Brown Publishing Corp., Richard E. Brown, President; R. S. Spengel, Secy. and Treas. Subscription price: U. S. $5.00; Canada, $5.00 per year; 50 cents per copy; Foreign, $7.50 per year. Entered as second class matter, January 10, 1949, at the Post Office, Jersey City, N. J., under Act of March 3, 1879.

Aluminum Lasts...

PUTS YOUR WIRE GOODS IN DEMAND

Take nails for example—made of Alcoa Aluminum Wire. They can make the difference between ugly red rust-streaks and siding that stays clean for a lifetime. Smart builders recommend aluminum nails. Smart home buyers demand them.

Alcoa Wire can give your products sales appeal like this. Make them lighter, longer-lasting, less expensive. Your present tools work well on Alcoa Wire. Its corrosion resistance eliminates costly finishing. Per pound it goes three times as far as heavy metals. Get the whole story by writing: ALUMINUM COMPANY OF AMERICA, 1950H Gulf Building, Pittsburgh 19, Pennsylvania.

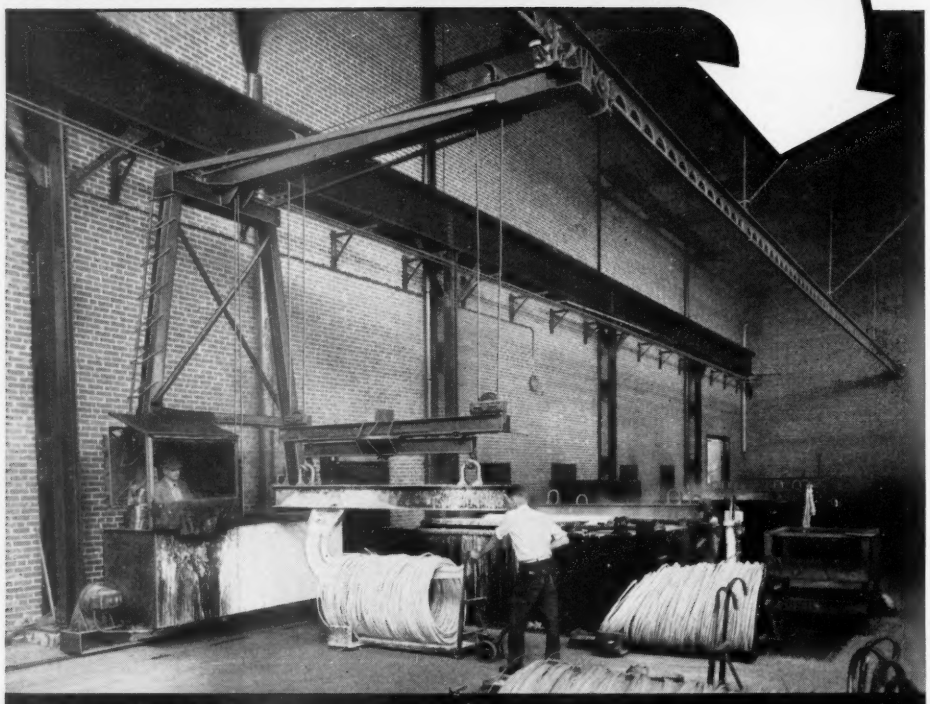
ALCOA FIRST IN **ALUMINUM**

ALCOA ALUMINUM ®

INGOT • SHEET & PLATE • SHAPES, ROLLED & EXTRUDED • WIRE • ROD • BAR • TUBING • PIPE • SAND, DIE & PERMANENT-MOLD CASTINGS • FORGINGS • IMPACT EXTRUSIONS
ELECTRICAL CONDUCTORS • SCREW MACHINE PRODUCTS • FABRICATED PRODUCTS • FASTENERS • FOIL • ALUMINUM PIGMENTS • MAGNESIUM PRODUCTS

CUT ROD AND WIRE CLEANING COSTS

THE CLEVELAND TRAMRAIL WAY

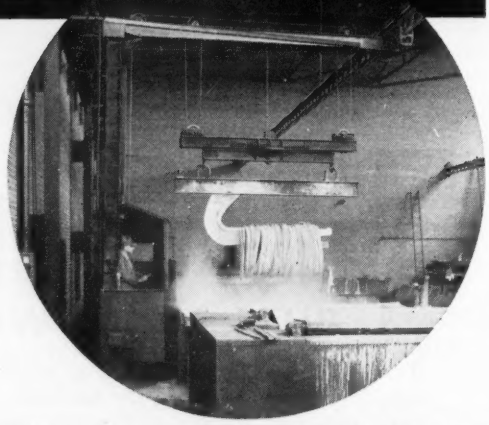


Hoisting machinery for this gantry crane is located next to operator's cab where protected from acids and fumes. Variations of this equipment have been built to suit special conditions. If desired, a movable trolley on gantry bridge can be furnished.

Nothing else that we know of can so cut costs and bring about other important advantages in a rod or wire mill, for the expenditure involved, as a modern Cleveland Tramrail cleaning house crane installation.

Cleveland Tramrail equipment completely revolutionizes cleaning house procedure and enables one man in the crane cab to run large tonnages through the cleaning cycle usually involving acid dip, water rinse, lime coating and baking. The equipment requires less than one-half the space for the old circular method and by the very nature of the layout used, a cleaner and more orderly room results.

The large number of installations now serving leading rod and wire producers attest to the advantages of the equipment. If you are interested in lower cleaning costs per ton by a method that quickly pays for the original investment, we suggest that you get the facts on Cleveland Tramrail cleaning house cranes.



3,300 lb. loads can be handled with this unit. Note the load bar is equipped with a swivel arrangement permitting turning the hook.

GET THIS BOOK!

BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy

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THE CLEVELAND CRANE & ENGINEERING CO.
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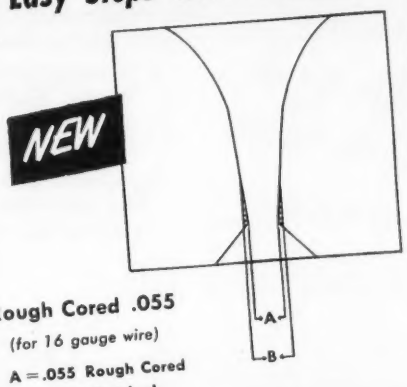
OVERHEAD MATERIALS HANDLING EQUIPMENT

You Can Depend on Firthaloy for Improving Operating Economies

Faster Finishing Time
... with minimum work

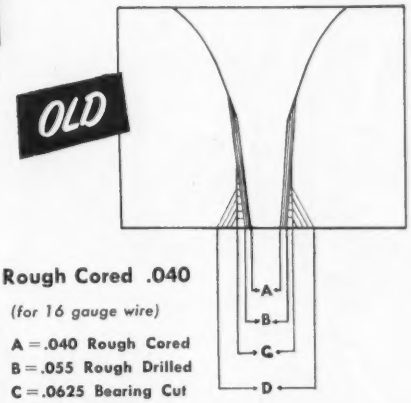
2 Finishing Steps Eliminated
... on sizes R-3, 4 & 5

2 Easy Steps with Firthaloy



Rough Cored .055
(for 16 gauge wire)
A = .055 Rough Cored
B = .0625 Finished

Twice as Many Steps in Finishing Old Style Dies



Rough Cored .040
(for 16 gauge wire)
A = .040 Rough Cored
B = .055 Rough Drilled
C = .0625 Bearing Cut
D = Back Relief

FIRTHALOY SUPER-STANDARD FEATURES:

1. New, Higher nibs
2. Preformed back relief
3. Cored holes — all standard sizes
4. Carbide Locked in steel
5. Positive back-support for nibs
6. Advanced nib contour design
7. Precision manufacture
8. Complete assortment of Firthaloy grades
9. Firthaloy die engineering service
10. Immediate shipment from stocks

The new standards are typical of Firth Sterling's everlasting efforts to improve operating economies in wire mills. You can depend on Firth Sterling to help you produce Better, Faster and Cheaper.

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7 Reasons why mills use Talide Rolls

Talide Work Rolls

Solid Carbide Rolls
(weighing up to 1000 pounds)
for Strip or Sheet

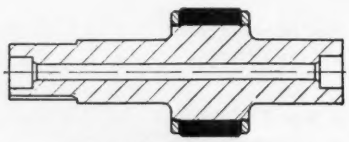
1. MORE PRODUCTION
2. BETTER FINISH
3. HIGHER SPEEDS
4. LESS DOWN TIME
5. CLOSER TOLERANCE
6. GREATER REDUCTION
7. FEWER REJECTS

● Profitable, increased tonnage with Talide Carbide Rolls can be had Mills regularly report astounding new figures. What's more, increased operating speeds and improved surface finish make subsequent polishing and buffing unnecessary.

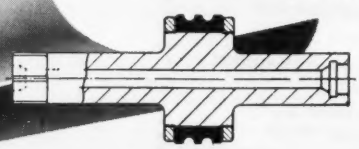
Talide Tungsten Carbide Rolls are used for ordinary finish or mirror-finish on such items as cold rolled stainless, spring steel, razor steel, alloys, carbon, aluminum foil, tinsel ribbon and flat wire.

Metal Carbides Corporation originally developed the art of making Carbide Rolls, and only this firm makes solid or sleeved Talide Carbide Rolls weighing up to 1000 pounds. Available in diameters up to 10" and lengths up to 40". We make the smallest and largest rolls in the world!

Write us today. We'll show you how to get *more production, better finish, higher speeds, less down time, closer tolerances, greater reductions* and *fewer rejects* on your mill operations.



Sleeved Rolls for Flat Wire



For Shape Wire

SINTERED CARBIDES
METAL CARBIDES CORPORATION
TALIDE
YOUNGSTOWN, OHIO
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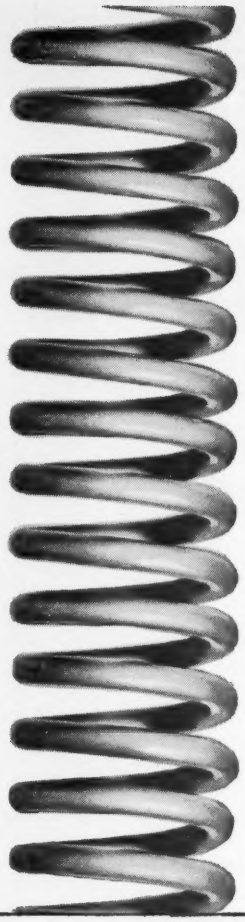
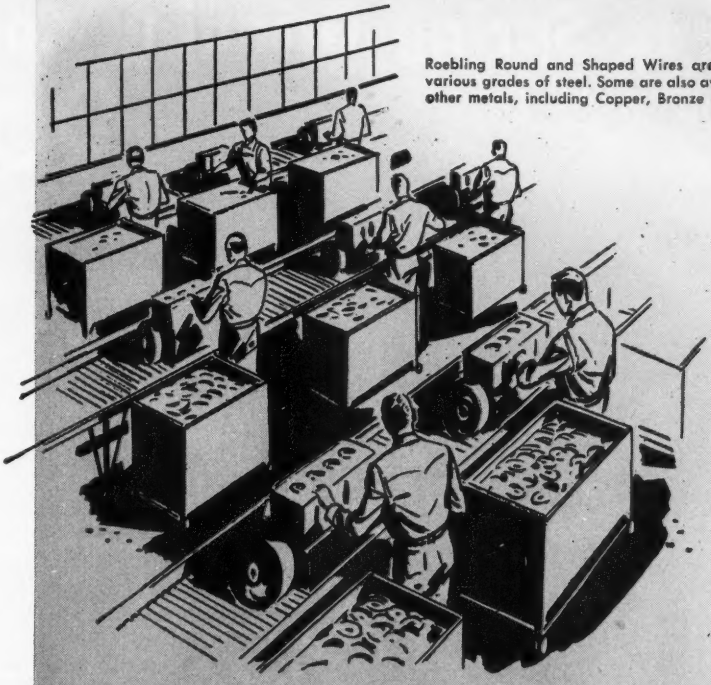
YOUNGSTOWN 5, OHIO *Pioneers in Tungsten Carbide Metallurgy*

CUTTING TOOLS · DRAWING DIES · WEAR RESISTANT PARTS





Roebling Round and Shaped Wires are made in various grades of steel. Some are also available in other metals, including Copper, Bronze and Brass.

Every inch dependably uniform... that's why users say...

Today it's Roebling!

for Oil-Tempered Spring Wire

NO IFS, ANDS OR BUTS . . . production records show that Roebling Oil-Tempered Spring Wire cuts down machine stoppages and minimizes rejects for users everywhere. This is a *quality* wire. Every inch is alike in gauge and finish . . . absolutely uniform in mechanical and metallurgical properties.

Roebling has one of the largest mills in the country for the making of specialty wires. From steel-making to finished wire, every manufacturing step is performed in Roebling's own plants. Modern techniques and modern precision equipment assure a product that saves you preparation time . . . brings faster, smoother operation.

Your Roebling Field Man will gladly help you choose the best wire—round, flat or shaped—for greatest efficiency and economy. John A. Roebling's Sons Company, Trenton 2, New Jersey.

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Keep Spring Grinding Costs DOWN

with Cost-Cutting NORTON *Discs*

Norton Vitrified Discs Offer:

Faster Cut—
more usable springs per hour

Cooler Cut—
a minimum of burrs, burning and distortion with resultant better quality

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the faster cutting action and more durable bond of Norton vitrified discs means less dressing is necessary —these discs last longer

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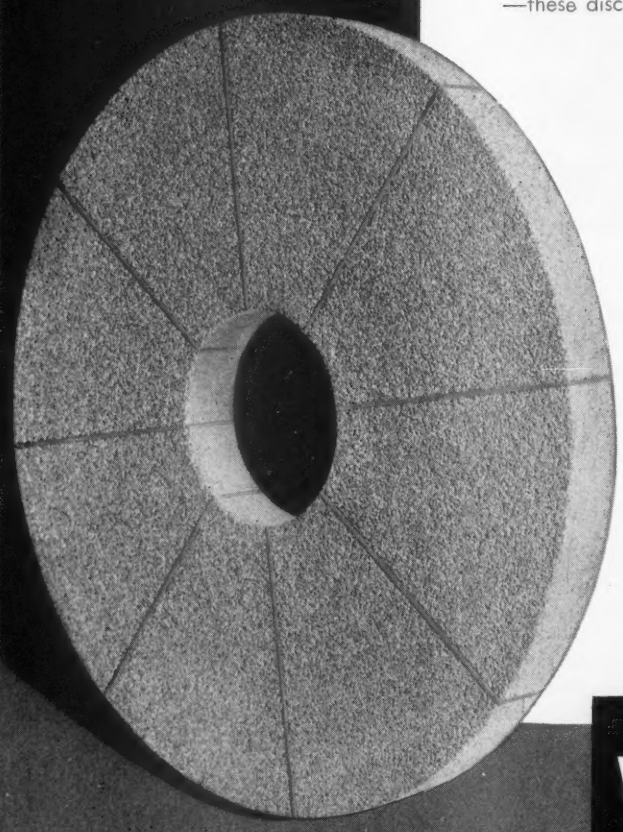
PLUS Lower Initial Cost—
vitrified discs cost substantially less than resinoid discs

Because They Contain:

The Right Abrasive—
fast, cool cutting 32 ALUNDUM, or sharp, tough 57 ALUNDUM abrasive; **the Right Bond** — vitrified; **the Right Grain Size; the Right Grade; the Right Structure**— open or "P" type; **the Right Type of Mounting.**



Take Advantage of Norton Service: Let a Norton abrasive engineer study your spring grinding jobs. He'll take into consideration the type of grinder used, the method of operation, the material ground, the size and shape of the work, and the finish desired. Then he'll recommend a disc of exactly the right combination.

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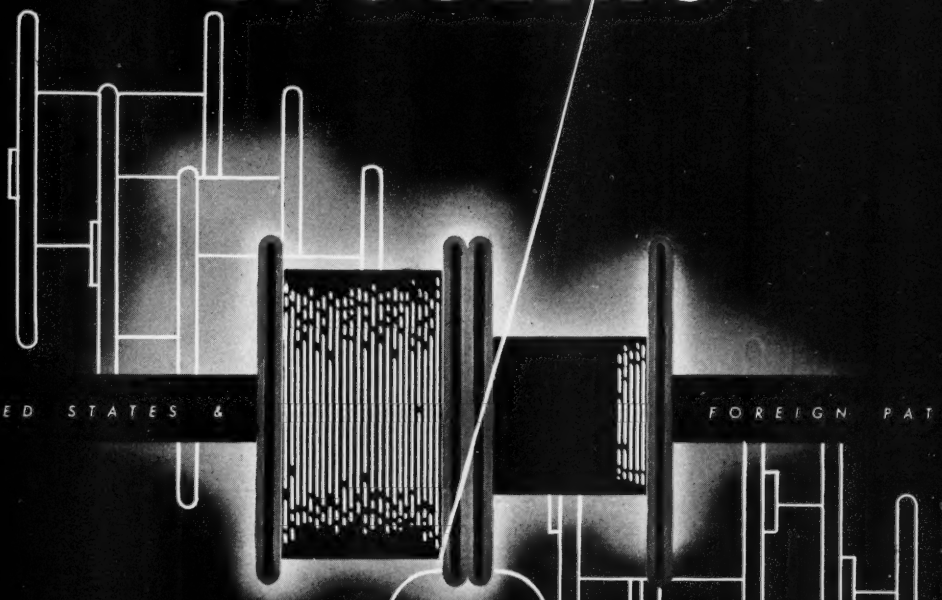
ABRASIVES

CONTINUMATIC SPOOLING



UNITED STATES & FOREIGN PATENTS

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3* CONTINUOUS AUTOMATIC SPOOLING

ENGINEERS ALL OVER THE WORLD ACCLAIM
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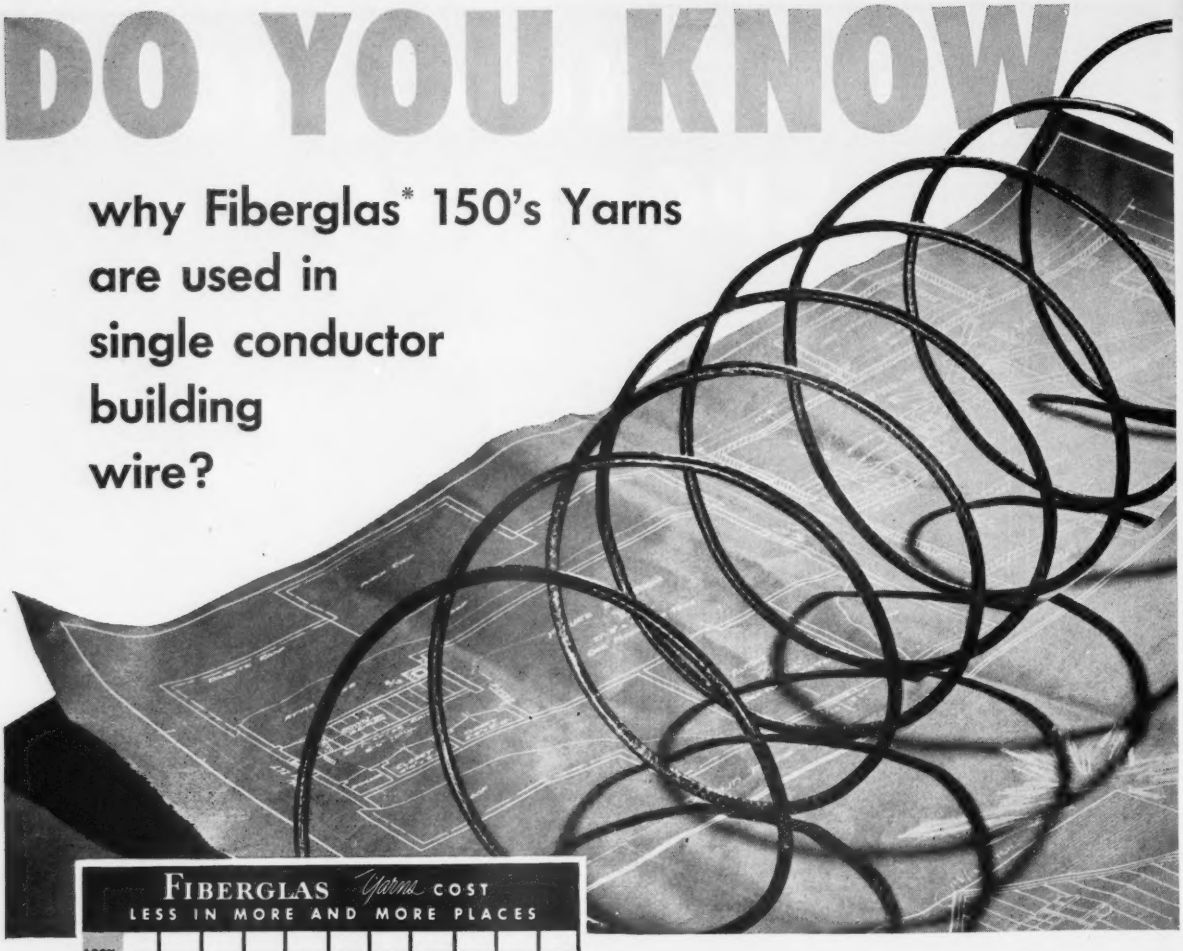
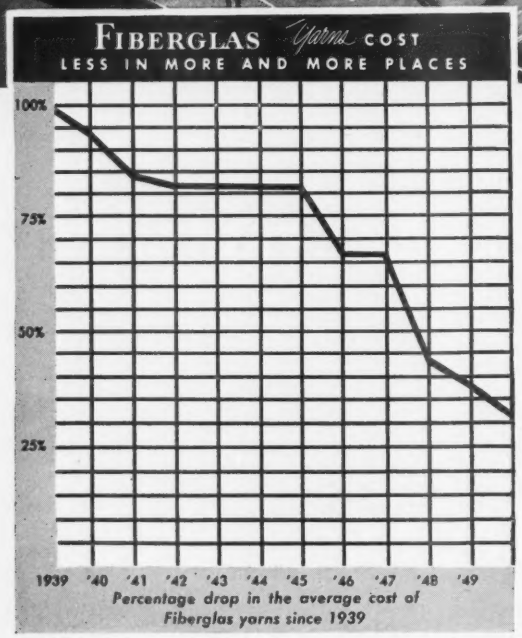
DO YOU KNOW

why Fiberglas* 150's Yarns are used in single conductor building wire?




FIBERGLAS Yarns COST
LESS IN MORE AND MORE PLACES
100%
75%
50%
25%
1939 '40 '41 '42 '43 '44 '45 '46 '47 '48 '49
Percentage drop in the average cost of Fiberglas yarns since 1939

FIBERGLAS *Yarns*

- *Resist rot . . . are PERMANENT*
- *Provide good yarn application efficiency*
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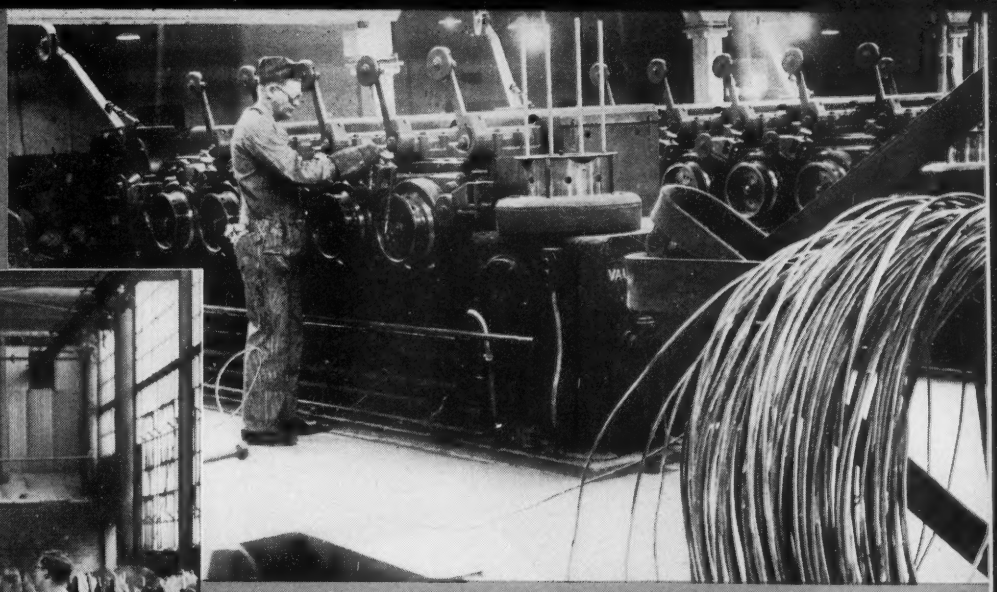
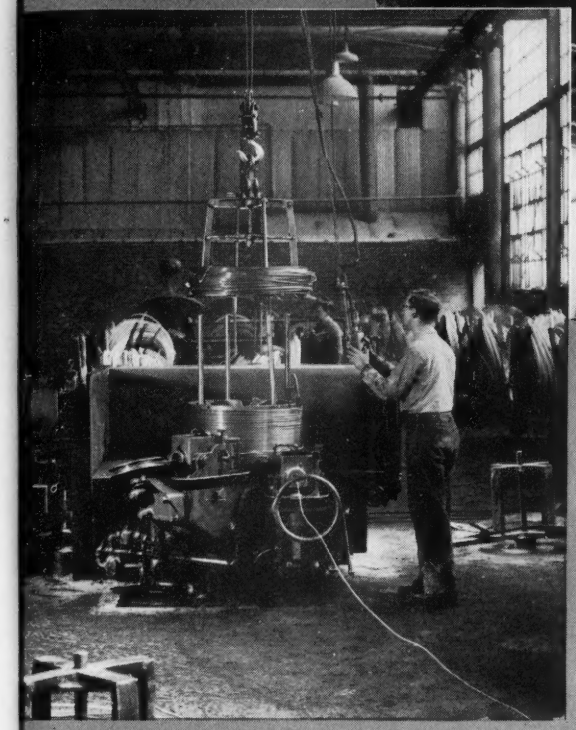
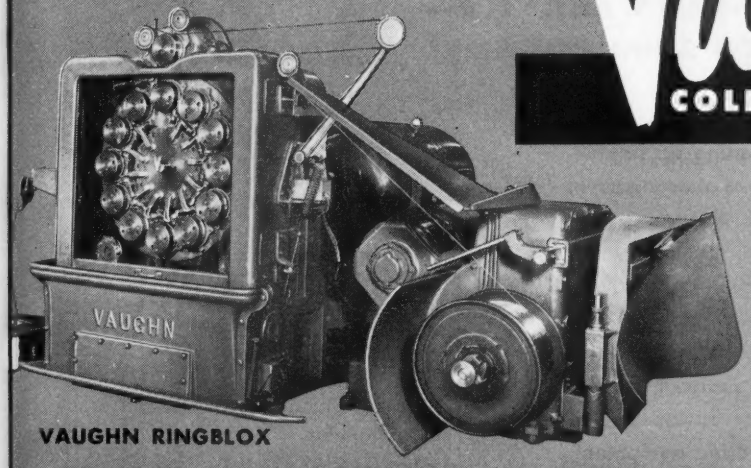




A Type and Size for Every Kind of WIRE BAR or TUBE . . .

Vaughn

COLD DRAWING MACHINERY



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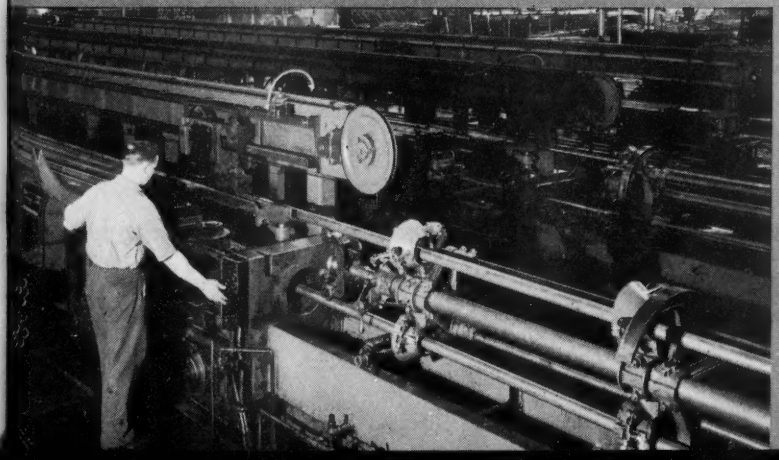
VAUGHN Machines are supplied in types and sizes to handle every cold drawing requirement of the metal-working industries—at higher rates of speed, with superior versatility, maximum safety and convenience. *May we match your needs with facts on the right Vaughn units?*

Vaughn, Motobloc, Motoblox—Registered U.S. Patent Office



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The VAUGHN MACHINERY CO.

Cuyahoga Falls, Ohio, U.S.A.

COMPLETE COLD DRAWING EQUIPMENT

Continuous or Single Hole . . . for the Largest Bars and Tubes . . . for the Smallest Wire . . . Ferrous, Non-Ferrous Materials or their Alloys

MODERNIZE YOUR PICKLING *and* MATERIAL HANDLING OPERATIONS *with* WELDCO LIGHTWEIGHT HAIRPIN HOOKS

THEY'RE CORROSION-RESISTANT-- BUILT FOR LONG, HEAVY-DUTY SERVICE-- HANDLE PAYLOADS UP TO 5000 POUNDS!

Steel mills and manufacturing plants throughout the country are cutting pickling costs and speeding up production with Weldco hairpin hooks, like the ones shown above. Made of hot-rolled Monel — or Stainless Steel — these sturdy hooks are lightweight but *tough* . . . withstand acid solutions . . . give years of long, economical service. They handle payloads up to 5,000 pounds, are exceptionally corrosion-resistant, and outlast heavy cast hooks 2 to 3 times.

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Standard SCORES AGAIN!

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PROTECTS BRIGHT FINISHES, LUBRICATES, PREVENTS RUST

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1. It will preserve bright color and finish on galvanized and tinned wire for several months.
2. Used on regular galvanized wire in barb wire or fencing machines, it provides sufficient lubrication for the forming work.
3. Is water dispersible and can be used in water quench box or in separate tank following quench box. Best results in latter at about 180° F.
4. Imparts rust preventive quality. Used 1/4 of 1% solution with lime substitute coatings.
5. It also shows excellent results as a drawing lubricant in copper, liquor finished or galvanized wire drawing.

Standard compounds are made for every specialized wire drawing or cold forming requirement. Standardize with "Standard" — and be sure of good results.

Our new coating compound for rod bolt and rivet stock is an example. "Ebony" compound for copper and aluminum drawing is another. Try them!

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STANDARD INDUSTRIAL COMPOUNDS COMPANY has pioneered most of the outstanding contributions to better wire drawing through better lubricants. Consult with any STANDARD representative for courteous, competent service.

wire drawing lubricants

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Plied, LOW TWIST

Vitron GLASS YARNS

cut your costs in both inventory and production

Now you can have low twist constructions in all our standard Vitron Glass Yarns—450's, NEW 300's, 225's and 150's. You get these money-saving advantages:

★ LOWER MATERIAL COST—as much as 20% to 40%

★ GREATER FLEXIBILITY—in pull-out and flyer speeds for increased production efficiency

★ VARIABLE BUILD-UP—by bunching or spreading the same yarn

★ REDUCED INVENTORY. Each low-twist package, doing its wide variety of jobs, cuts yarn inventories as much as *one-third*.

We'd like to show you these versatile low-twist yarns and to work with you in adapting them to your production. Call us in for complete information.

Here are the Performance Properties of VITRON

- high strength
- withstands 1000° F.
- dimensionally stable
- excellent electrical properties in minimum space
- absorbs no moisture
- resistant to rot, mildew, oils and most acids
- easily impregnated or coated

Will these qualities improve your product? If so, we'd like to help you profit from them.

Vitron®
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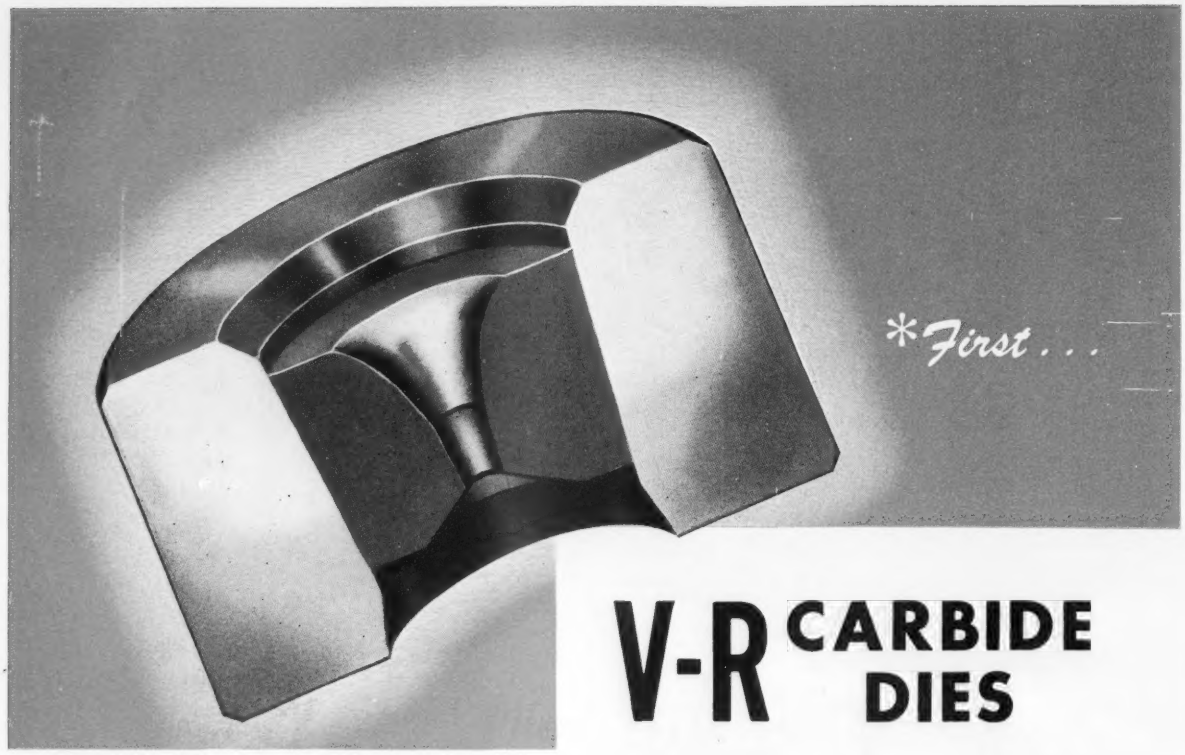

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The Wire Outlook

It is hard to convince ourselves, official assurances and hopes to the contrary, that the Korean flare-up will not spread to the balance of the globe. Russia is already organizing and arming an "international" army for Far-East service made up of citizens of her satellites. This means that the Korean conflict in all probability will be long, hard and full of hazards that may lead to widespread conflict.

We could underwrite the Korean campaign of quelling the bandit invaders without disrupting our production facilities and without lifting tax rates sharply, but industrialists must now think of and be prepared for the prospect of a general mobilization. At this writing the President has already indicated that this may be done soon.

Now is the time if there ever was one for the Congress and the Administration to exhibit patriotism by dropping politics and considering AMERICA first.

This would entail a complete trimming out of all "do-good" operations, like price supports, and welfare measures, as well as cutting down all bureaus to bare functional necessities. The elimination from the public payrolls of $2\frac{1}{2}$ or 3 million bureaucrats would be a first step toward victory and ultimate soundness. Washington is planning to spend $6\frac{1}{4}$ billions this year on price supports alone. Why? To what end?

A word more about the veto of Bill S1008. Operation of steel mills under the F.O.B. pricing system tends to set up local monopolies. One Western mill "enjoys" such a monopoly now, which is not proving to be the universal blessing it might seem.

Before the Supreme Court cement decision, the company had competition from Eastern and Mid-Western mills. However, when the basing-point system was abandoned, since many of their supplies came from Eastern sources, their costs rose —and so perforce did prices. Their customers are unhappy because these prices are higher than in the East.

With the veto of the basing-point bill, we established a government of men and not of laws with respect to pricing. The President, in his veto message, commented on the situation, which Senator O'Mahoney, who had championed it, interpreted by saying: "Thus it is quite clear that there is no bar to freight absorbtion or delivered prices as such. I take this to be — the desire of the President — that the Federal Trade Commission should not bring any proceedings against any seller who, by individual action, without combination or conspiracy, adopts either of these practices."

This may be construed as a green light for those who desire to re-establish their basing-point pricing policies, but it must always be borne in mind that as long as we have a "government of men," there can be no guarantee that the F.T.C. will not misconstrue such action. Several steel concerns have taken the chance and abandoned F.O.B. pricing. Could all do it with assurance, a more equitable distribution system would be restored. The Western mill in question, for one, would welcome it.

Further price rises have been recorded during the past month all along the line. The war scare has not helped. The order of the day, both for industry and the consuming public seems to be to try to accumulate stocks of supplies before they go higher or become scarcer. Naturally, prices respond to such abnormal buying.

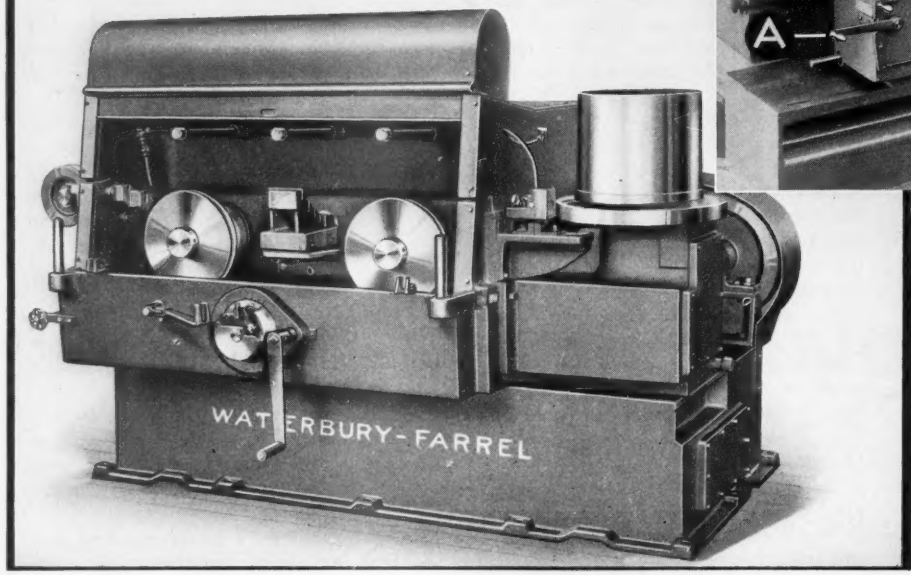
Industrial fastener makers are enjoying their largest volume since 1948. Heavy backlogs of orders assure good business through the balance of the year, with the automotive field contributing strongly to this condition. This is in the face of an almost complete falling off of exports. Japan is beginning to serve the Far East and European countries are taking a good share of our South American and other markets. The reason is: lower prices. Imports of wire rods and nails are growing rapidly in this country and are being used as far west as Chicago.

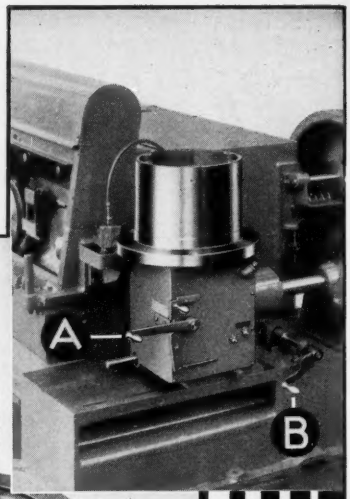
Strong demand for wire of all kinds continues. Heading wire is especially active. Merchant wire products are among the fastest moving steel items. Baling wire, fencing and nails lead the parade in demand.

Come what may in international affairs, the country will be united and do its part. But it is high time that every red or red-sympathizer was made to feel that this good land of ours is not a safe place for his treacherous and twisted machinations.

—from the Editor's Desk.

WIRE DRAWING MACHINES





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A monthly publication devoted to the production of Wire, Rod and Strip, Wire and Rod Products and Insulated Wire and Cable.

DRAWING — ROLLING — EXTRUDING — FORMING — FABRICATING

Vol. 25 AUGUST, 1950 No. 8

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Lancaster, Allwine & Rommel, Consultants on Patent Information

R. S. Spengel, General Manager
J. Edward Donnellan, Vice-President
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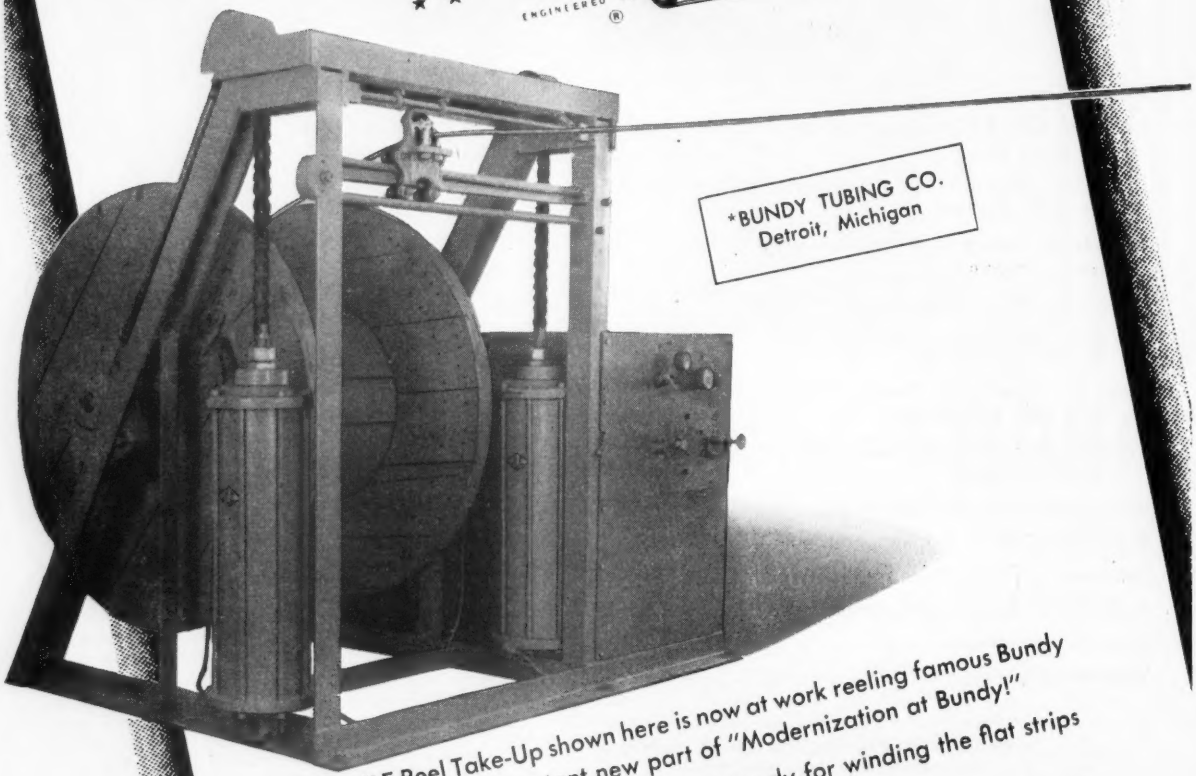

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A monthly publication devoted to the production of Wire, Rod and Strip.
DRAWING — ROLLING — EXTRUDING — FORMING — FABRICATING

Vol. 25 AUGUST, 1950 No. 8

Electrical Wire & Cable Insulation By the Extrusion Method

By B. H. Davis, Secretary - Sales Manager,
The Standard Machinery Company,
Mystic, Connecticut.

A paper on an improved method of manufacture of insulated electrical conductors by the use of the screw type extruding machine. The author also points out the economies accruing with the use of this method of extrusion.

THE manufacture of insulated electrical conductors was a tedious and expensive process prior to the invention and application of the screw type extruding machine to this type work. Early insulated conductors were hand made, so to speak, and some of the earliest specimens were hand covered by cloth that had been soaked in beeswax, a cotton cloth covering saturated with gum shellac, the painting of installed applications with tar-like compositions and other crude methods.

★ ★ ★

JUST prior to the use of rubber, about 1860, gutta percha was used. This, along with the first applications of rubber, was applied by spiral wrapping of the conductors with tapes of the insulating materials.

★ ★ ★

AS nearly as can be determined, the screw type extruding machine originated in Germany some time previous to 1870. An English firm, Francis Shaw & Company, along with other organizations, produced tubing or "spewing" machines, as they called them, in the 1870s. In the United States, the screw type extruder was apparently introduced by Edred W. Clark, a Hartford, Connecticut, machine builder. His machine, although not produced for many years, was widely copied as a basic design by other early American manufacturers. The Clark machine, although produced here in the 1880s, was a true work horse and one will find an occasional one still in operation and doing a fair production job on some of the older type rubber compounds.

★ ★ ★

Early Applications

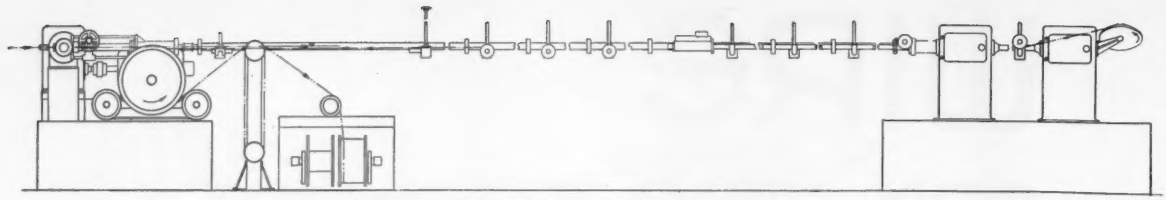
THE rubber industry first used the screw type extruder for the manufacture of seamless tubing which had formerly been made by spiral wrapping a rubber tape around a metal mandrel and cementing together before vulcanization. Most of this tubing was also bound or wrapped with a spirally wound fabric tape before going to the vulcanizing chamber and this tape was removed after the curing operation.

★ ★ ★

WITH the introduction of seamless tubing in the rubber industry, the next logical step was to cover wire with a seamless sheath of insulation of this most

B. H. Davis

Benjamin H. Davis, secretary and sales manager of The Standard Machinery Company, Mystic, Conn., was educated in Brooklyn, N. Y., and Ridgewood, N. J., schools and New York University. He has been connected with the extruding machine business for twenty-one years, twelve of them as Eastern Sales Engineer for John Royle & Sons. He is a member of the Wire Association and is considered an authority on many phases of the insulated wire and cable business. During World War II, he was civilian consultant to the Signal Corps on electrical wire and cable insulation. The Davis-Standard line of extruding machines is a product of Mr. Davis' long, intensive field experience.



DAVIS-STANDARD CONTINUOUS VULCANIZING EQUIPMENT

Fig. A—Davis-Standard Continuous Vulcanizing Equipment.

satisfactory material. Two types of extruder were originally used, the straight delivery insulating machine and the cross or right angle type. The straight delivery machine had a relatively shallow stock screw to move and force the rubber insulation material forward, and the wire itself passed through the center of the screw to a fixed tip mounted in a bridge or supporting member at the head end of the screw. The joint or seal between the rotating screw and the fixed tip was the greatest drawback of this early type piece of equipment. However, the compact extrusion chamber that could be designed around this kind of unit probably was one of the reasons why it gave such remarkable service—aside from the maintenance factor—for many years.

* * *

THE side or cross delivery head dates back to the very early days of wire insulation by the screw extrusion process. Early crossheads resembled a plumber's common elbow, were just about as bulbous and were always equipped with a cock or bleeder to serve as a compromiser or overflow. Such an overflow was needed for two basic reasons: first, early extruding machines were generally powered by flat leather belts and a series of single or cone pulley steps in speed. Because of the numerous sizes of wire and more or less limited speed variation available for handling equipment over a broad range of wire sizes, this bleeder was the great compromiser as to the amount of compound one would have to dump on the floor rather than burn up in the extruder due to excess internal turbulence on the small wire sizes.

* * *

THE second most practical reason for the bleeder was, of course, the bulbous, crude design of the early crossheads. The compound would, like competitors on a race track, seek the inside or pole position, this being the shortest and fastest route. The compound on the far side would move more slowly and, accordingly, run a good chance of curing or setting up before getting out of the head. The bleeder could be opened up to stimulate the movement of stock on the far side, with resultant loss of overall efficiency.

* * *

Early Wire Handling Equipment

TWO early methods of handling the insulated rubber wire as it came from the extruder were the panning method and the drum cure process. In either case, the wire was pulled through the tuber or extruder by a rotating capstan, generally driven from the same shaft as the extruder and with cone and belt type adjustable speed gear, or, in later years, with a "Reeves" type transmission for changing speed relation between extruder and capstan. By adjusting this transmission, the operator was able to maintain the required thickness of wire insulation.

* * *

IN the panning method, the insulated wire was traversed into a rotating circular pan and each layer was isolated from the next by a liberal dusting of powdered soapstone or other material. The pan was then, along with others, sent to a vulcanizing chamber for curing.

* * *

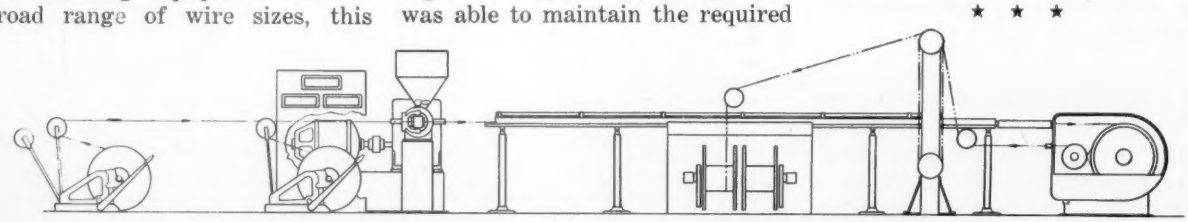
THE drum cure method was quite similar, except that the wire was quite thoroughly soapstoned by an applicator and then wound on a relatively large diameter, but shallow drum, which in turn with other drums was charged to and cured in a large conventional vulcanizer.

* * *

Continuous Vulcanizing Process

DURING the late 1920s and early years of the thirties, great strides were made by two of the largest producers of electrical wires and cables in this country by development of the continuous vulcanizing process. In recent years, practically all small wires and jackets for flexible cords have been manufactured by this process with highly satisfactory results. A typical set-up of this equipment is illustrated by Fig. **A**, showing equipment designed expressly for applying and continuously curing large flexible cord jackets.

* * *



DAVIS-STANDARD THERMO-PLASTIC WIRE INSULATING EQUIPMENT

Fig. C—Davis-Standard Thermoplastic Insulating Equipment.

IN this process, the wire or core is supplied to the extruding machine by the pay-off. In the machine it is covered and generally delivered directly to the vulcanizing tube through a movable and completely sealable splice box or opening. As the insulated wire or cable travels through this vulcanizing tube, being pulled by a capstan with very broad speed adjustment, it is vulcanized by steam at 250 lbs./sq./in. and of about 300 lbs./hr. The wire leaves the tube through a seal mechanism generally actuated by compressed air and, in the case of common insulations over copper, is returned over a sheave, through a cooling trough, back to the rotating capstan and thence to the take-up which is usually of the continuous type shown in Fig. B.

* * *

THE great success of the continuous vulcanizing process has been made possible by the development, by chemical firms, of ultra accelerators resulting in curing time on thin coverings being cut to a matter of seconds. Compounds using these accelerators work very well in the clean, streamlined, modern extruding machines and heads without pre-curing problems, and literally explode into cure when exposed to the high pressure saturated steam in the vulcanizing tube.

* * *

Thermoplastic Insulation

THE thermoplastics, as insulating materials, have had a most remarkable growth during the approximately ten years of their use in the wire industry. Each day, new applications are found for insulations of this type. Development of plastic materials has stimulated machine designers to meet the demand and, in turn, has brought forth many new features that have been outstanding.

* * *

EARLY application of these new materials was made on pepped-up rubber extruders. High pressure steam was applied to cylinder jackets and heads. The compound

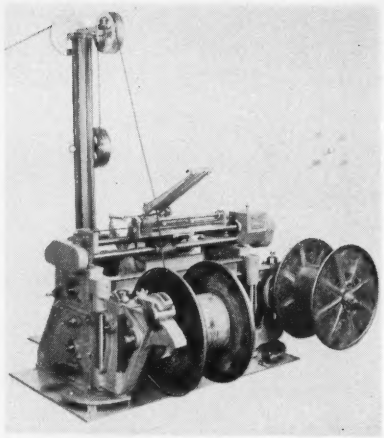


Fig. B—Watson Machine Company continuous cutover type take-up.

was warmed on heated mills and delivered to the extruder as rapidly as possible.

* * *

AT the necessary high working temperatures, however, the compound lost heat rapidly and results from mill-warmed stock were not too uniform.

* * *

THE first phase of machine development came with the cylinder extension, longer screw, jacketed head and an oil circulating system with which oil at temperatures between 300° and 370° F was circulated through the extruder.

* * *

THIS system worked much better than the earlier high pressure steam heating method and, coupled with still further stock screw development, allowed compound in strip form and at room temperature to be fed to the extruder. By feeding the compound at a fixed room temperature, the wire diameters were also held to a much closer tolerance.

* * *

ALTHOUGH the elongated and oil heated extruder did an excellent job throughout the war years, it was very troublesome because of its heating system leaks, odors and constant pump packing problems. Its temperature range was also more or less limited, due to the inherent properties of available oils.

* * *

SEVERAL years back, nylon began to find favor in the wire industry as a jacketing material for certain types of wire. The nylon jacketing job required application of temperatures of better than 500° F and oil was not quite up to the task. It was at this time that direct electrical heat made its appearance.

* * *

THE direct electrically heated extruding machine of today has taken over the task and is doing a most excellent job. This type machine has been developed to the point where most accurate control of temperature is held on all materials falling between the 300° F and 700° scale. These machines come up to working temperature in a fraction of the time required by older oil heated equipment and operate with a minimum of power-on cycle. Most simple methods have been devised to avoid any possible heat build-up problem and long continuous runs have proven the worth of the general design.

* * *

COMPLETE accessory equipment, from pay-off to take-up, are available for thermoplastic as well as rubber insulation. A typical unit for thermoplastic wire insulation is shown in Fig. C.

* * *

IN the plastic coating of wire, the bare wire passes from the pay-off reels, through the extruder head where it receives its coating, thence through a cooling trough (water) where the jacket is "set," over the wire-pulling capstan, to the take-up reels. All operations must be in synchrony with the extruding speed.

* * *

IN wire and cable insulating, there are problems common to both rubber and plastic operations. One of the greatest of these is in maintaining the conductor concentric with the jacket. The Underwriters require certain minimum wall thicknesses on the various types of wire. Any deviation from this minimum must be toward the

upper reaches and not below it. Therefore, if a wire will not run concentric, the manufacturer must run much wasteful extra coverage to insure minimum required. Even a slight extra thickness on the billions of feet of wire run yearly amounts to a staggering dollar value in pure waste.

★ ★ ★

AMONG the causes of eccentricity are improperly controlled extruding temperatures, incorrect flow properties inherent in some head designs, resulting in displacement of the conductor toward the wall farthest from the screw. In the best modern equipment, these causes are eliminated.

★ ★ ★

Accessory Drives

IN the control of the wire handling elements in rubber and plastics wire and cable insulating, there has always been something lacking in the attainment of **true** synchrony between extrusion speed and capstan and take-up speeds. Mechanical devices, including shafting, pillow blocks, right angle gear boxes, clutches, transmissions and other means are in widest use. These are easily understood by the average mechanic and, if properly engineered and installed, offer a certain measure of workability. However, they are not accurate and often contribute to wire breakage and eccentricity because of the failure to synchronize. Too, they are clumsy, inefficient and clutter up the work floor.

★ ★ ★

HYDRAULIC accessory drives and controls are, in some ways, an improvement on the mechanical drives, as they "glide" into their power pull with something less of the "jerk" of the mechanical devices and have less structural material running over the floor.

★ ★ ★

REFINEMENTS in both mechanical and hydraulic accessory drives have been made throughout the years, resulting in improvements, but always "just missing" that nebulous "something" that was to bring about complete synchrony of related units. Working with some of the largest electrical motor and control firms for some years, a dependable all-electric system has been designed to do all that the mechanical and hydraulic outfits did and to do it better, with **nothing** running across the floor between units. Concealed electrical wiring is all that connects extruder, capstan and take-ups. A master device, with a single handle, is turned, and all units respond in unison, at correctly integrated speeds.

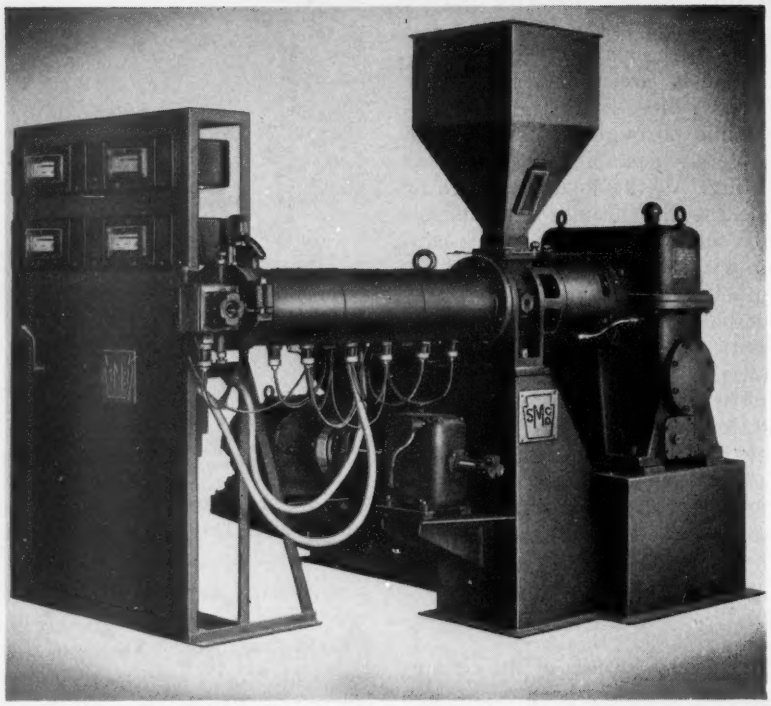


Fig. D—3¼" Davis-Standard Thermoplastic Insulating Machine, Showing Temperature Control Panel.

★ ★ ★

RECENTLY, much talk and effort has been directed toward the so-called dry-mix type of thermoplastic compound feed, which would be the ultimate in thermoplastic insulating work if properly worked out. Apparently, up to the present writing, nothing really tangible has come of this type operation.

★ ★ ★

IN rubber insulation, cold-feeding of compound to the extruder has made great progress and has much promise.

★ ★ ★

DURING the writer's years in this particular field, great strides have been made. Plants not in existence several years back have been conceived and have grown into major enterprises; many new and energetic small ones have come into existence. As long as the country grows, the demand for electrical energy and its transmission shall also grow.

★ ★ ★

THE trend in the industry seems to be toward specialization and, with specialization, the trend of machine requirements has been toward more custom-built machine applications.

TO WIRE MILL MEN

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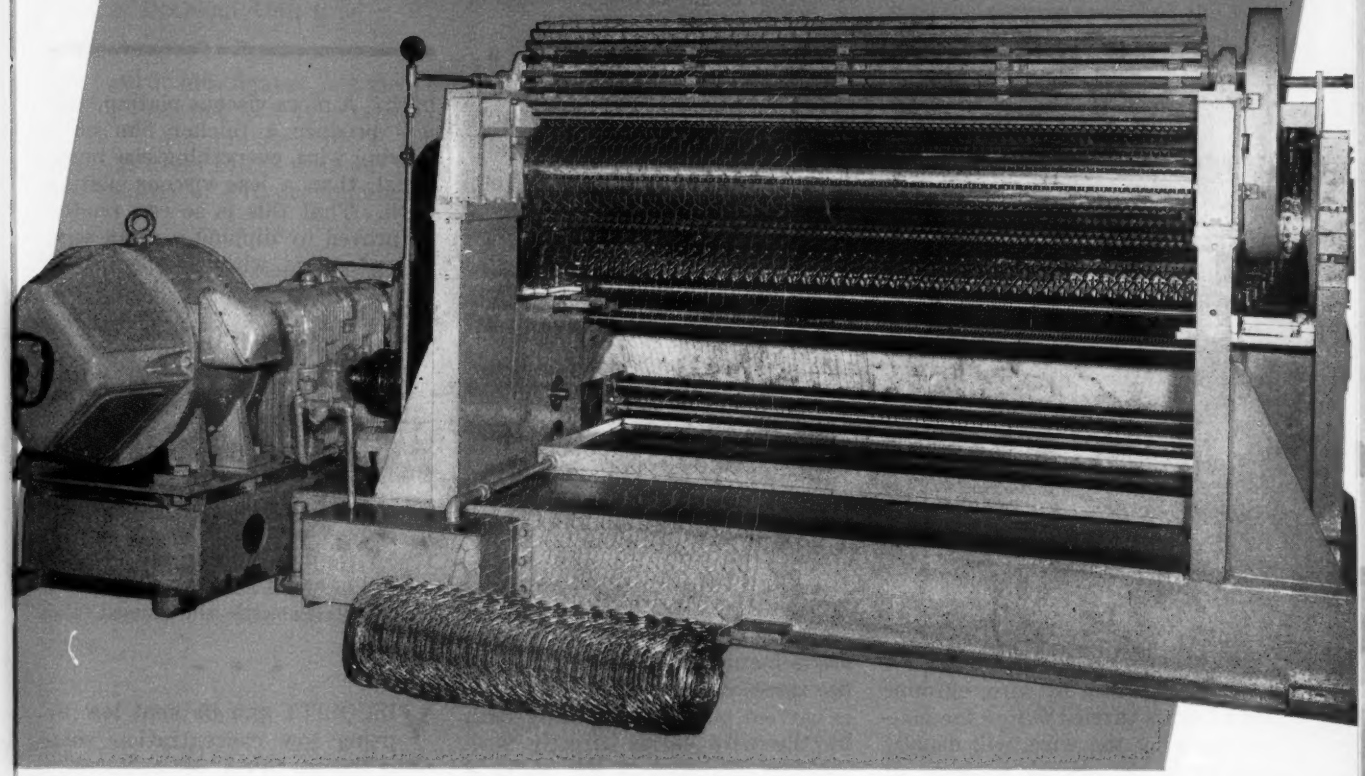

Wean Wire Machinery is engineered and built to give you the last word in modern, up-to-date, high efficiency equipment. Just as the pictured hexagon netting machine doubles or triples present production, so do other Wean machines — both process and product — lead the way in boosting production, lowering costs and assuring better wire products.

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Wean Equipment Corporation
CLEVELAND, OHIO

Drag-Out Losses in Wire Plating

Part II & III

Joseph B. Kushner, Ch.E.
Consulting Electroplating Engineer
Stroudsburg, Pa.

In this issue are presented Parts II and III of Mr. Kushner's treatise on drag-out losses. Part I was published in May, 1950.

Part II

Ways and Means of Reducing Drag-Out Losses

DRAG-OUT losses in wire plating are particularly important, economically speaking, where precious metals are being plated out. In gold plating on fine wires, for example, the financial losses through dragout can be considerable. Strangely enough, drag-out losses from wire plating baths containing less precious solutions, have assumed considerable economic importance also, in the recent past, in connection with sewage problems.

★ ★ ★

TO give an instance, in the chromium plating of wire, chromic acid that is carried out of the plating bath by the wire, will usually end up in the sewage system. It is a matter of contemporary fact that many states are passing or are about to pass, stringent stream pollution laws and that local government ordinances may raise hob with plating plants whose effluent of waste contains in any amount, chromic acid and/or any of the toxic or bacteriocidal ions.

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IT is desirable, therefore, from all standpoints, that drag-out losses be either prevented or minimized or recovered.

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COMPLETE prevention of drag-out losses is a well nigh impossible task, Rollers, squeegees, doctor blades, compressed air, may help, but they cannot solve the problem completely. Where wire diameters are small and their velocity is high, such devices as rollers are soon ineffective because of the grooving that occurs, unless the bearing surface is continually changed. Likewise, doctor blades are quickly worn through because of the friction and whipping of the wire. Some of the liquid remains on the wire in any event.

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THERE are some possibilities of minimizing these losses that are sometimes overlooked. Thus, the actual amount of material that is carried out of the plating bath by the wire varies directly with the concentration of the material in the plating solution. To give a simple example, if in chromium plating copper wires a 53 oz./gal. solution is used originally and subsequently changed to a 33 oz./gal. solution, there is an immediate reduction in drag-out loss of 38%.

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THIS leads at once to Rule No. 1 for minimizing drag-out losses: **Maintain the concentration of the plating bath as low as possible compatible with good results.**

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A SECOND possibility for minimizing drag-out losses lies in the viscosity of the plating solution, which is in turn intimately connected with the concentration and temperature of the plating bath. A more viscous plating bath will produce a thicker film on a moving wire, everything else being equal, than a less viscous plating bath. That this is so can readily be proved by dipping a clean wire in water and withdrawing it and doing likewise with another clean wire in glycerine. Invariably, the glycerine film will be thicker.

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THIS leads to Rule No. 2 for minimizing drag-out losses: **Keep the viscosity of the plating bath as low as possible compatible with good results;** where there is a choice of 2 plating baths that will give equal results, choose the plating bath with the lowest viscosity.

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VISCOSITY can be kept low by using low concentration solutions though this is not necessarily a criterion inasmuch as certain salts are more viscous than others when dissolved in the same amount and there are some compounds that tend to lower the viscosity of already concentrated solutions of other substances. Viscosity can also be kept lower by using warmer, or hot plating solutions inasmuch as a rough approximation the viscosity drops about 2% for every degree temperature rise with many dissolved substances. Incidentally, a warm or hot solution is desirable in connection with a method of drag-out recovery proposed in a later paragraph.

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A THIRD possibility of minimizing the drag-out loss lies in the velocity of the wire itself. The

total drag-out loss from a wire per unit time is equal to the volume of liquid carried per ft. of wire multiplied by the velocity of the wire. However, the volume of liquid carried per ft. of wire varies very roughly with the velocity of the wire. Accordingly, the total drag-out loss per unit time varies approximately with the square of the velocity of the wire.

Total Drag-out/Unit time $\propto V^2$.

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TO put it into figures this means the drag-out loss at a velocity of 10 ft. per minute will be 100 times as great as the drag-out loss at a velocity of 1 ft. per minute.

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THIS leads to Rule No. 3 for minimizing drag-out losses: **For a desired production schedule it is better, from the standpoint of reducing drag-out losses, to use a larger number of wire lines at a lower velocity than less wire lines at a higher velocity.**

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THESE three Rules cover the principles of minimizing drag-out losses. Next, we will cover the methods of recovering drag-out losses.

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Part III

The Use of Recovery Rinse Baths

THE standard technique for recovering material that is carried out of the plating tank, is to make use of one or more drag-out tanks.

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A DRAG-OUT tank consists of a tank immediately following the plating tank. This tank contains pure water and the principle of its operation is that the valuable liquid film on the wire is diluted in this tank. The wire leaving the drag-out tank carries with it a much more dilute solution of the valuable electrolyte. To make a simple analogy, the drag-out tank is the equivalent of a bank in which the deposits are greater than the withdrawals and thus there accumulates in a period of time a considerable amount of savings which can be withdrawn in total at certain set intervals.

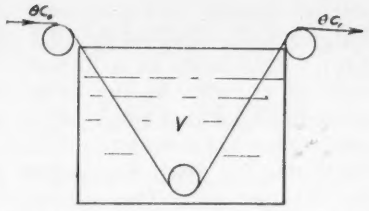

Fig. 4—Stagnant Drag-Out Tank.

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IT is of interest to analyze the operation of a drag-out tank. Consider the tank shown in figure 4. In operation, $\ominus$ gpm of electrolye with a concentration of C_0 oz./gal. are entering the tank whose volume is V gallons. Leaving the tank are $\ominus$ gpm of dilute solution with a concentration of C_1 oz./gal. (assuming film thickness remains constant and mixing is perfect). Since this is a continuous process, a differential equation can be set up for it. In terms of the time t, and the concentration C_1. This equation is:

(9)

$$\frac{d\,VC_0}{dt} = V\frac{dC_0}{dt} = \theta(C_0 - C_1)$$

★ ★ ★

AT this point it should be noted that at equilibrium, when there is no further change in C_1 $\frac{dC_1}{dt} = 0$ AND $C_1 = C_0$. Thus it can be seen that at and near equilibrium, the recovery rinse tank (drag-out tank) is worse than useless as it serves only as an intermediate step to the drain. For whatever valuable metal is being carried into it, is being carried out of it, at the same rate! This is something that is often misunderstood. Platers frequently permit the operation to approach equilibrium by not changing the water in the recovery tank often enough.

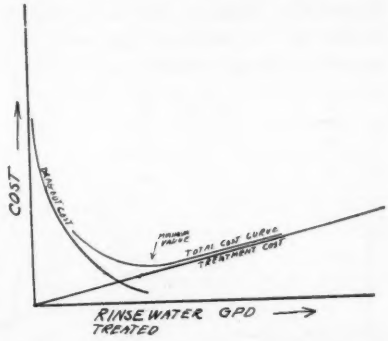

Fig. 5—Plot for Optimum Drag-Out Changeover.

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THIS drag-out tank solution is usually pumped to a heating treatment where it is boiled down to concentrate the values, or some of it is spasmodically poured back into the plating tank and the rest is either boiled down or permitted to remain in the tank in the mistaken belief that it will continue to accumulate the losses from the plating tank. An example will make clear what is meant.

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IF equation 9 is integrated by the standard method we get as a result:

(10)

$$C_1 = C_0\left[1 - e^{-\theta t/V}\right]$$

where e is the base of natural logarithms.

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IF a concentration of plating salts in the recovery tank equal to .9C_0, is taken as approximating equilibrium conditions ($C_1 = 9C_0$) and we solve equation 10 for t, the time required to reach this equilibrium, we get:

(11)

$$t = \frac{V}{\theta}\ln 10 = \frac{2.3\,V}{\theta}$$

since 2.3 is the natural logarithm of 10.

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LET us take as a practical case a gold plating installation in which 24 wires are being plated at one time with a flash coating of gold. The drag-out rate is equal to .0002 gpm per wire and the volume of the recovery rinse tank is 50 gallons. How long will it take to arrive at equilibrium as defined by equation 11?

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THE total drag-out per minute when the machine is in operation is equal to .0002 x 24 = .0048 gpm, so the time t, in minutes will be equal to 2.3 x 50 = 24,000 or

$$\frac{}{.0048}$$

50 working days.

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ASSUMING the value of the gold plating solution to be $15 a gallon, the recovery tank now holds 50 x .9 x 15= $675 worth of solution. But the total value of the solution that left the plating tank as drag-out during the 50-day working period is equal to 24,000 x .0048 x 15 = $1728! In other words by operating this way only 39% of the loss is recovered.

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SUPPOSE the recovery rinse water is changed every 10 days. The total value of the solution carried out during this time is equal to 4800 x .0048 x 15 = $345. After this period of operation the concentration of the solution in the recovery rinse tank is given by equation 10 and solving this for t = 4800 gives $C_1 = .37C_0$ so the value of the solution in the recovery tank is equal to 50 x .37 x 15 = $277.50. By operating in this manner 80% of the drag-out loss is recovered. As can be expected, the more frequently the water is changed in the drag-out tank the higher does the recovery percentage become.

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TO recover the values in this rinse water, it must be treated in some way. Regardless of whether the rinse water is evaporated, electrolyzed or put through an ion exchanger for recovery of the values, such a treatment will cost money and this fact leads to a simple method of determining how often the rinse water should be changed.

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AS indicated in figure 5, by plotting cost of water treatment against number of gallons treated per day, a straight line is obtained. Using the same coordinates, the cost, in terms of drag-out loss, is plotted against the frequency of water change (gallons treated per day). This leads to a hyperbolic type of curve. Adding both up gives the total cost curve which as can be seen has a definite minimum value not far from the region of the intersection. The number of gallons of rinse water per day at this minimum is the measure of the optimum number of times the recovery rinse water should be changed to give the greatest recovery at the least cost. This technique can always be used in designing or redesigning wire plating systems, to arrive at the best conditions of operation.

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THE recovery system just described, making use of a stagnant rinse tank, depends for its operation on the avoidance of equilibrium conditions in the rinse tank, and involves the processing of the rinse water to recover the values. There is another type of recovery rinse tank system, involving running rinse tanks in which the rinse water is returned to the plating bath and the operation is under equilibrium conditions, that has been arousing considerable interest. It is particularly applicable where the plating solution is warm or hot.

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IN this system, the basic principle of which is illustrated in figure 6, the rinse water is fed back automatically to replenish the evaporation losses of the plating tank. There are a number of automatic control devices which can operate such a process and in all the principle is the same: to continuously replace the evaporation losses of the plating tank with the recovery rinse water.

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LET us say that the evaporation loss from plating tank is E gpm and as before, the drag-out loss is Θ gpm. Then at equilibrium what goes into the rinse tank must come out so

(12)

$$\Theta C_0 = (\Theta + E)\, C_1$$

or

$$C_1 = \frac{\Theta C_0}{\Theta + E}$$

★ ★ ★

THE evaporation rate of ordinary water solutions as used in plating will run from .0005 to .007 gpm per sq. ft. of open tank surface, depending on the solution temperature, so it is quite possible for the drag-out rate to approach or even possibly exceed the evaporation rate. If, for example, the drag-out rate is equal to the evaporation rate, the equilibrium concentration C_1 becomes equal to $.5C_0$ so that in continuous operation only 50% of the loss is recovered. This being so, with a system of this type it is advisable to use a plating tank with as large a surface area as possible, with the solution as warm as possible. This ties in very nicely with Rules No. 2 and No. 3 previously mentioned in connection with minimizing drag-out losses.

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HOWEVER, even all these expedients may not be able to give a sufficiently high recovery rate and use must be made of a second, third, or even possibly a fourth recovery rinse tank in series with the others as shown in figure 7.

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BY simple though somewhat tedious calculation, it can be shown that the equilibrium concentration in the second tank, in terms of the

(Please turn to page 695)

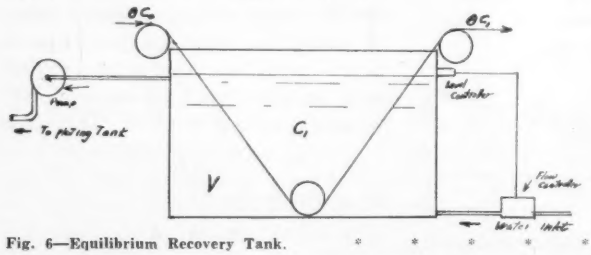

Fig. 6—Equilibrium Recovery Tank.

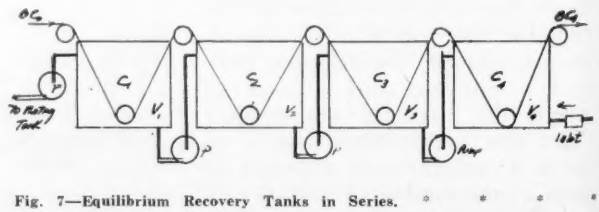

Fig. 7—Equilibrium Recovery Tanks in Series.

Mechanical Scaling of Low Carbon Steel Rods

By J. Peignier—Ingenieur I.C.A.M.

Societe Metallurgique de Gorcy

Paris, France

Mention is frequently made of mechanical descaling methods, on which problem a number of concerns are working to perfect equipment. Necessity is the mother of invention, it is said, and the need in France to get along without acid pickling, has resulted in the method described here, that its sponsors have found to work satisfactorily. The author states that while the process described is confined to .197" rods, the size used in France, it will work on rods up to ½" in diameter.

WHEN a piece of hot-rolled rough steel undergoes deformation, when cold, by lengthening, bending, twisting, etc . . . it is noticed that the superficial scale layer breaks off from the underlying metal and crumbles by parts.

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THIS inaptness of the scale to withstand such deformation permits the cleaning of rods by mechanical means, instead of the usual pickling.

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Improvement in Mechanical Scaling

THE lack of acids in France during the second world war prompted the French wire manufacturers to use and to improve mechanical scaling, the principle of which had been known for a long time, but had not found till then favourable conditions for extensive use.

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TO start with, mechanical scaling was used in combination with pickling, which gave a saving of acid in the ratio of 6 to 1. This way was only a temporary means of getting over the acid shortage, as the rods were scaled by running through roll breakers and, after winding into coils, were transferred to the pickling plant for final cleaning.

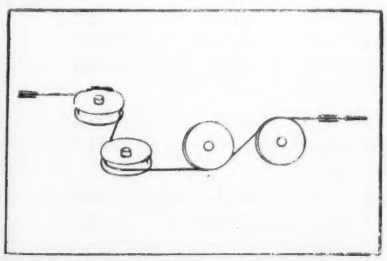

Fig. I: Sketch of the initial descaler

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THESE successive operations were generally more expensive than the normal pickling.

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HOWEVER, in the early months of 1941, the "Societe Metallurgique de Gorcy" who specialize in the production of low carbon rods, endeavoured to eliminate chemical pickling by setting up a rudimental scaling machine ahead of the wire-drawing machines.

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THIS apparatus was made up of a set of four rollers upon which the rod strand was bent in two perpendicular planes (see sketch Fig. I). When running over these rollers, the greater part of the scale was broken away from the rod strand, which then went directly through the first die of the wire-drawing machine.

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THIS process showed such advantages that it was decided to perfect it, with the following purposes:

1—The elimination of the scale, without causing the surface of the rods to become polished, which would have been detrimental to drawing soap coating.

2—The possibility of building an apparatus taking up little space, requiring a minimum of maintenance and adjustable to the majority of rod drawing machines.

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THE various experiments ended in the construction of a mechanical unit which operated the scaling in two steps (see sketch, Fig. II).

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(a) Breaking Up of the Scale:

FROM the flipper, the rod strand is first subjected to deformation in two different planes by running it over a pair of rollers, mounted on axes at right angles to each other. The scale, which is unable to withstand such deformation, breaks up and falls away. There only remain on the surface of rod strand small particles of scale clinging thereto, which are removed by the subsequent cleaning step.

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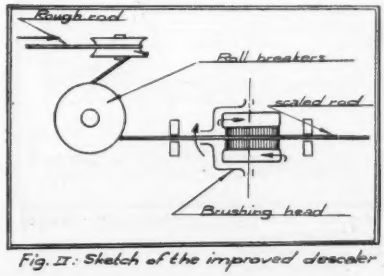

Fig. II: Sketch of the improved descaler

(b) Surface Cleaning of Rods:

FOR this purpose, the rod strand runs through a set of two metal brushes enclosed in a casing.

* * *

THESE brushes are of the flanged or disk type and are disposed on opposite sides of the rod strand around which they revolve while being rotated in reverse directions. As a result of this disposition an uniform brushing action takes place upon the whole surface of the rod strand, which remains in a perfectly centered position, since the brushing efforts exerted on the strand balance and cancel each other out.

* * *

ON coming out of the brushing device the rod strand, practically cleared of its scale, then passes on to the wire-drawing machine, where it is directly and continuously drawn without any other intermediate operation. Fig. III shows a wire-drawing plant fitted out with such mechanical scaling machines.

* * *

THE manufacture of these units, which are covered by patents both in France and abroad, was firstly experimented and finally constructed by the "Etablissements LINE," at Albert (Somme), whose works also produce modern precision machine tools.

* * *

THE overall dimensions of the model planned for scaling 0.197 inch diameter rods are about 50 inches in length, 24 inches in width and 42 inches in height. All the mechanical parts are specially protected against scale dust.

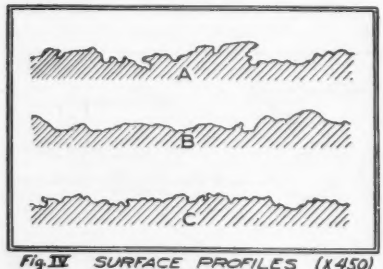

Fig. IV SURFACE PROFILES (x450)
A. Rough rod
B. Descaled rod
C. Pickled rod

Fig. III—Plant Interior

The setting up of this apparatus moreover does not require the use of an individual auxiliary power-plant or of a drive transmission worked by the general power supply of the workshop, as the roll breakers and the brushing head are operated by the feed movement of the rod strand to the wire-drawing machine.

* * *

THE scaling machine therefore starts up and stops automatically at the same time as the wire-drawing machine.

* * *

Effect of Mechanical Scaling on Low Carbon Rods and Wire

COMPARATIVE tests have been carried out on samples of low carbon steel rods and wire, coming from the same cast, but having undergone beforehand either a mechanical scaling process or else the usual pickling in a hot solution of sulphuric acid.

* * *

Removal of Scale:

CHEMICAL tests give very similar and low figures, from which it may be deducted that, in both processes, the removal of scale is almost the same and works out at approximately 99%.

* * *

Surface Profiles:

COMPARATIVE tests have also been carried out reproducing

(*Please turn to page 693*)

Description of the samples	Ultimate tensile strength in kilos per-square millimeter	Elongation per cent	Reduction of area per cent
A—5 M/M DIAMETER ROD			
1) after hot-rolling	48	33,8	72,2
2) after chemical pickling	47,3	31,9	71
3) after mechanical scaling	54,9	21,8	70,4
B—4 M/M DIAMETER WIRE			
1) drawn from pickled rod	74,5	10,4	59
2) drawn from scaled rod	77,3	13	59,4
C—2 M/M DIAMETER WIRE			
1) drawn from pickled rod	108,9	10,3	45,2
2) drawn from scaled rod	108,8	10,3	45,2

FIG. V—Comparative table of the physical properties of mild steel rod and wire after chemical pickling or mechanical scaling.

Wire Association Pacific Coast Regional Meeting

Details of The Annual Pacific Coast Regional Meeting of the Wire Association held at the Sir Francis Drake Hotel, San Francisco, California, June 16, 1950.

ONCE again the Pacific Coast Regional Meeting of the Wire Association, which was held at the Sir Francis Drake Hotel, San Francisco, California, June 16, 1950, was most successful.

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REGISTRATION and a "get-together" session was held in the morning. In the afternoon a plant inspection visit was made to the Wire Mill of the California Wire Cloth Corporation in South San Francisco, a division of the Colorado Fuel & Iron Corporation, and in the evening a cocktail party and dinner was held, followed by the technical session.

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THOSE who visited the plant commented favorably on its increase in size and improvement in equipment installed. The photographs shown herewith will give an excellent idea of the general layout and production processes.

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THE Chairman at the dinner was "Bill" Mohr, superintendent of "Calwico," and the speaker was A. M. Riddle, Manager Market Research, Colorado Fuel and Iron Corporation, Denver, Colorado, who discussed the topic "The New West Moves Ahead," published in this issue of WIRE AND WIRE PRODUCTS.

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FOLLOWING a fifteen minute intermission after dinner there was a technical session primarily devoted to the use of borax in drawing wire. Papers by Curtis Voightlander, Superintendent, Wire Mills, Union Wire Rope Corporation, Kansas City, Mo., and Charles R. Mehl, President, Industrial Compounds Company, Los Angeles, Cal. were presented.

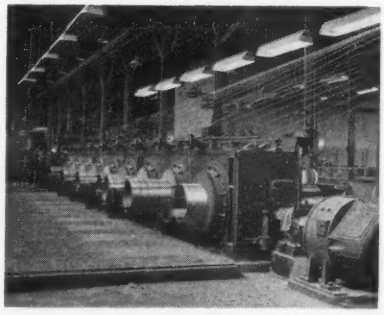

Fig. 1—Galvanizing Takeup Frame—18-Block Vaughn at Calwico's Plant. * * *

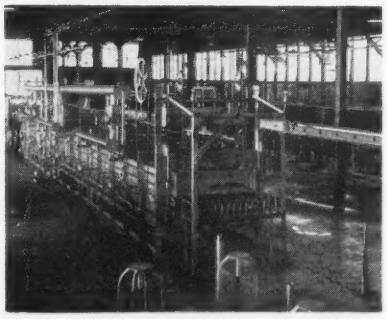

Fig. 2—Rod Patenting Furnace. Fired with Natural Gas—Oil Standby. Natural Gas Equip. Co. in Calwico's Plant. * * * *

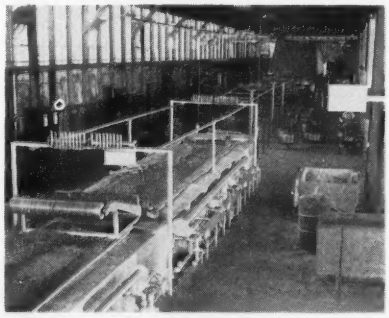

Fig. 3—Galvanizing lead pan and Payoff in Calwico's Plant. * * * * *

★ ★ ★

MR. VOIGHTLANDER'S paper was read by R. T. Merril, Superintendent of Wire Mills, Columbia Steel Company, as Mr. Voightlander was unable to be present. The subject covered was "The Use of Borax in Drawing High Carbon Steel Wire."

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THE paper presented by Mr. Mehl was entitled "Wire Finishes and Trade Requirements." Both papers appear elsewhere in this issue of WIRE AND WIRE PRODUCTS.

★ ★ ★

A DISCUSSION of drawing and cleaning methods brought out some interesting differences in practices and considerable data as to various plating methods now in use and what may be looked for in the future.

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AT the speaker's table were:

John Moritz—Supt. of Keystone Steel & Wire Company, Peoria, Ill. and Vice President of the Wire Association.
Chas. R. Mehl—Pres., Industrial Compound Company, Los Angeles, Cal.
Richard E. Brown—Executive Secretary of the Association, Stamford, Conn.
Andy Riddle—Manager Market Research —C.F. & I., Denver, Colorado.
William Mohr—Supt., Calwico, So. San Francisco, Cal.
R. T. Merril—Supt., Wire Mill, Columbia Steel Company, Pittsburg, Cal.
K. H. Baessler—Works Mgr., Calwico, Oakland, Cal.
Earl R. Potter—Vice Pres., Industrial Wire Products Company, Los Angeles, Cal.

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THE arrangements for the meeting were under the direction of Karl H. Baessler, Works Manager of Calwico.

(Please turn to page 686)

The New West Moves Ahead

By Andy M. Riddle Manager of Market Research
The Colorado Fuel and Iron Corporation
Denver, Colorado

Mr. Riddle presented the accompanying talk before the Regional Meeting of the Wire Association at San Francisco, California, on June 16, 1950.

I WAS very happy to receive an invitation from **Karl Baessler** to speak at your dinner meeting this evening. It gives me an opportunity to compliment the wire industry of this country for its record of outstanding achievement through the years, and to review briefly the industrial progress that is being made by western states.

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THIS is an important period in our history since we are at the halfway mark of the Twentieth Century. There will be many new problems to solve in the years ahead but the Wire Industry is made up of the kind of men who will always accept the responsibility and challenge of helping to preserve the industrial leadership of the United States.

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THE Wire Association, which was started in 1930, has proved to be a great force for good in bringing wire men together for the exchange of ideas. The plan has not only helped to build warm and lasting friendships among the members, but it has also helped make possible the scientific advancement of one of America's most vital and wide-awake industries.

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WE salute, too, the recent Twenty-Fifth Birthday of the **WIRE AND WIRE PRODUCTS** Magazine. In the first issue of this magazine, **Dwight Granger,** then a metallurgist for the **Wickwire-Spencer Steel Company,** presented an article on the subject of "The Elongation of Wire and Its Products." Wickwire, as you know, has since 1945 been a part of The Colorado Fuel and Iron Corporation.

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THE CALIFORNIA WIRE CLOTH CORPORATION has been a part of C. F. & I. since 1937, and I want to tell you this evening that in all of the combined divisions of our company there are men who believe in the importance of the wire industry, as you do; who believe in its high ethical standards, as you do; and, like yourselves, will continue to devote their best thought and energies to the perpetuation of this basic industry that has become such an integral part of our American way of life.

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Andy M. Riddle, Manager of Market Research, The Colorado Fuel & Iron Corporation, Denver, Colorado. * * * * * *

THE SPENCER WIRE COMPANY, founded in Massachusetts in 1812, was the start of the Wickwire Spencer Company. At that time only the crudest methods were known in this country and wire was drawn by hand. **Eliott Prouty,** who founded the early company, had the vision of early pioneers when he said: "There is a great future in wire and I know how to make wire so strong that a team of oxen can't break it."

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THE California Wire Works was founded in 1859, and from this early start The California Wire Cloth Corporation was developed, again by men of courage and vision who saw the need for wire products in building a new empire.

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IT was in 1872, in the Colorado Division, that the first of the companies that were later to be formed into The Colorado Fuel and Iron Company, was born and later at the turn of the century the manufacture of wire products again was seen as an important need in the building of the West's basic industries.

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C. F. & I. HAS backed its belief in the future of the wire industry with a large program of improvement and modernization, and particularly in recent years many new wire product machines have been installed. The program was highlighted in the latter part of 1949 by the completion of a new and modern rod mill at our Pueblo Plant. The rods from this mill not only serve the new and expanded finishing equipment in the Colorado Division, but have also helped to make possible

the modernization of wire product machinery at Calwico's plants in California, in keeping with the rapid industrial expansion of this entire Pacific Coast region.

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OTHER steel companies on the Pacific Coast have also added new wire producing and finishing capacity.

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AMERICA is a wonderful country and you men in the wire industry have helped make it so with your skill in research, in production, and in distribution. Your industry has been one of the important examples of the success of our American Enterprise System, and I think everyone connected with the industry should consider himself a member of a public relations committee, empowered with the full responsibility of telling the story of wire and the importance of wire products to the national economy.

★ ★ ★

CHANGE is a great irresistible force. You can slow it down; you can speed it up; but you can't stop it. In looking back over the changes that have taken place, I am reminded of the merchant who was celebrating his own hundreth birthday. A reporter went out to interview him and said: "Mr. Brown, it must be wonderful to be privileged to live a hundred years. You must have seen a great many changes." "Yes, sir, I hev," was the answer, "and by Hockey, I've been agin every one of 'em."

★ ★ ★

TO those who may not be aware that broad changes have been made in the western economy in recent years, we need only to refer the advertisement that appeared 86 years ago in a San Francisco paper:

"Wanted—young, skinny fellow, not over eighteen. Must be extra bright, willing to risk death daily. Orphans preferred. Wages $25 per week. Apply Central Express, Montgomery Street, San Francisco."

That was the birth of the Pony Express carrying mail from St. Joseph, Missouri, to San Francisco in ten days. Now it is done by air mail in a few hours.

★ ★ ★

IN carrying on our market research studies, I have visited many towns and cities in various western states during the past several years, and it is an exciting experience to see the many changes and improvements that are being made in the industrial pattern. There is growing recognition that the resources of the West can be developed to a much higher point, and that there is sufficient skill, initiative and determination to get the job done. Today there is a tremendous interest in manufacturing more products of all types to help give better balance to the mining and agricultural economy.

★ ★ ★

THE development of new and expanded industries has been particularly marked since World War II. Population has increased, larger markets are developing, manufacturing and fabrication has assumed new importance, and coupled with the production of our basic industries, the western region has gained in stature and in the promise of greater opportunity in the years ahead.

★ ★ ★

DENVER, Pueblo, Colorado Springs, and other cities in the mountain states area have diversified their industrial production by the manufacture of many new products, including new wire fabrication, mining machinery, farm equipment, food items, precision instruments, automotive supplies, and many others. Texas and other southwestern states have grown industrially in an amazing manner and today power saws, newsprint, chemicals, and many other products are in manufacture; wrist watches and telephone dial sets are being made in Lincoln, Nebraska; Utah is making brake linings, soap, insulation materials, fabricated steel products, and other manufactured goods; Arizona, New Mexico, Kansas, Oklahoma, and other western states have made progress in manufacturing and are keenly alert to new industrial possibilities.

★ ★ ★

INDUSTRIAL expansion on the Pacific Coast in the past several years, with both new plants and expansion of present plants, has, of course, been phenomenal. In factory employment, in new metal working projects, in home building, in trade, in nearly every activity, the spectacular rise of this region has been one of the most significant industrial developments in United States history.

★ ★ ★

THE 1947 Census of Manufactures showed a gain of almost eight thousand new manufacturing establishments in the three states of California, Washington, and Oregon, from the previous census of 1939. Value added by manufacture increased from $1½ billion in 1939 to over $5½ billion in 1947. Many new plants and plant additions have been completed in these states since the Census report, and a variety of new installations are now under construction in 1950.

★ ★ ★

IN California alone, the total value added by manufacture rose from $1.1 billion in 1939 to $4.0 billion in 1947, a gain of 256%. The corresponding U.S. gain was 204%. California now has over three factories for every two operating in 1939 and in total number of plants now ranks second only to New York.

★ ★ ★

IN the 16 western states, including the Pacific Coast, there was a gain of over 12,000 manufacturing establishments reported by the 1947 Census, since the 1939 report, and value added by Manufacture increased over $6½ billion since 1939. Additional gains have also been made since 1947.

★ ★ ★

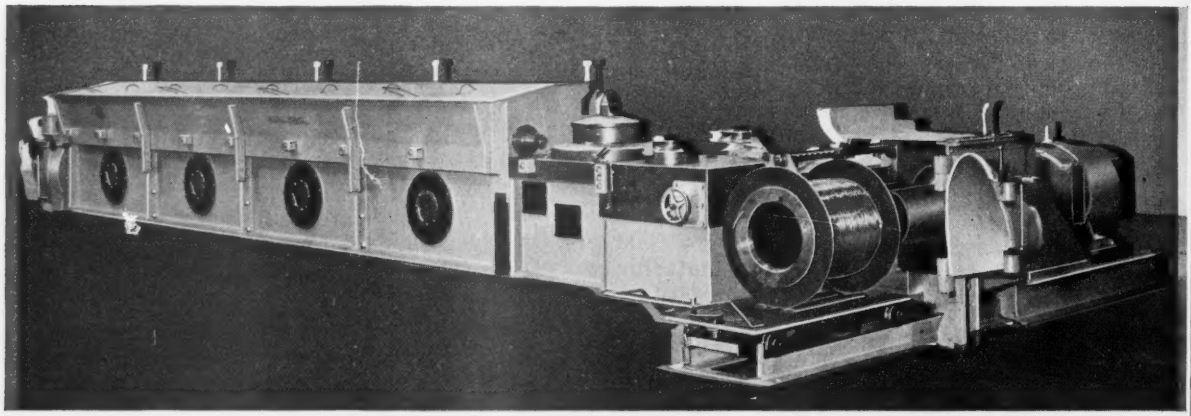
IT is recognized that expansion of present industry is of primary importance, but new industry programs are also being developed by cities and towns throughout the entire West to encourage companies in other parts of the country to establish branch plants.

(*Please turn to page 680*)

New HIGH SPEEDS in

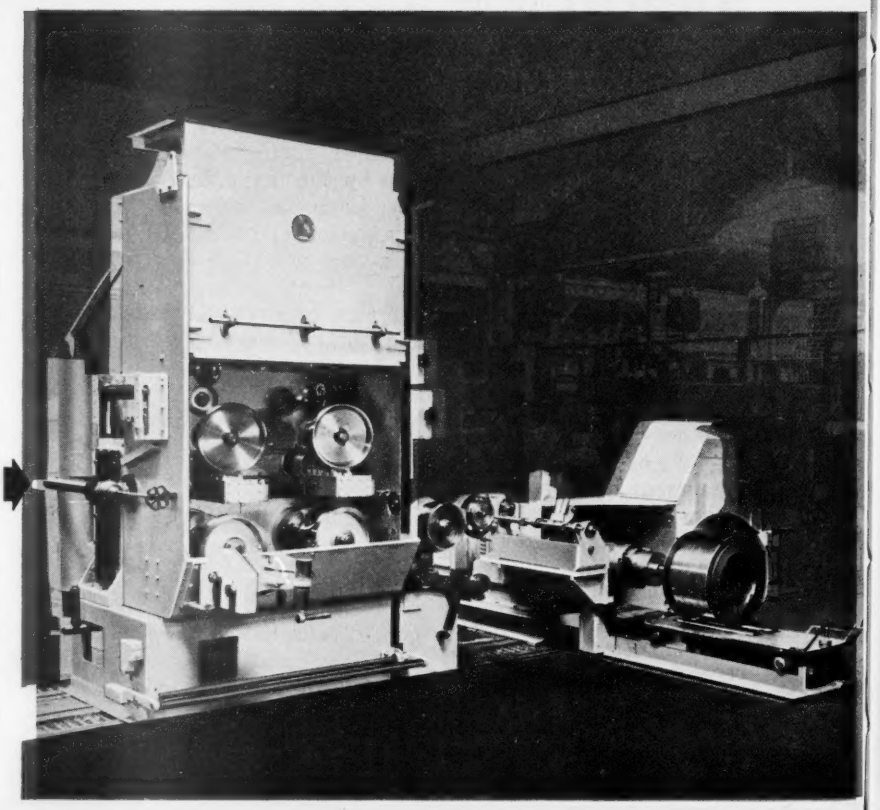
Now a new line of Marshall Richards equipment to slash your production costs!

THESE THREE Marshall Richards machines are brand new to the United States but have already proved their outstanding merit in leading European wire drawing plants. Between them, these machines cover the full drawing range from copper rods and intermediate wire sizes to fine wire. All of them set completely new highs in drawing speeds . . . and all have special design features that assure utmost efficiency, exceptionally economical operation, and wire of unsurpassed, uniform quality.



TANDEM COPPER ROD MACHINE—4000 FT./MIN.

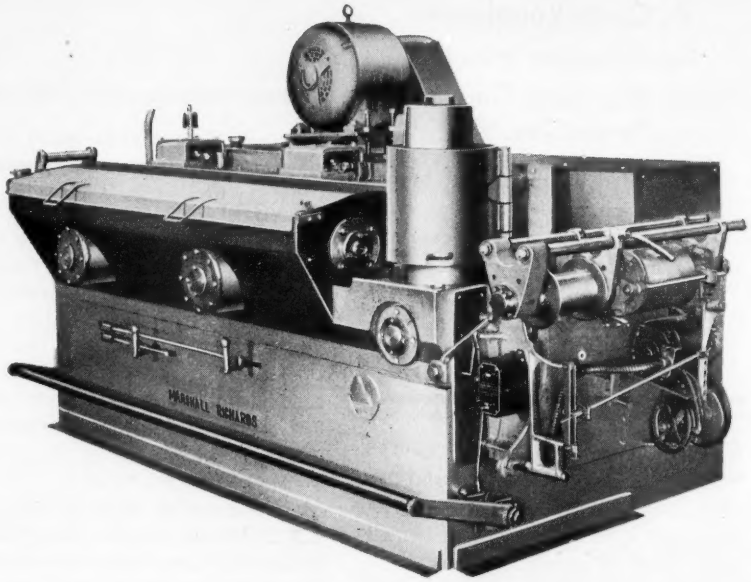
This new Marshall Richards Tandem Type Rod Machine has *vertical* capstans so that both dies and driving spindles are completely submerged in liquor. Powerful jets of liquor are also directed into the entrance cone of each of its 7 (or 9 or 11) dies. These features bring longer die life and superior wire quality . . . permit faster speeds. The standard electric spooler has a capacity up to 2000 lbs.



INTERMEDIATE WIRE DRAWING MACHINE—6000 FT./MIN.

New Marshall Richards Type 13H is a spray and jet lubricated machine for drawing the intermediate sizes of wire. Four cones with six steps each draw wire through 13 dies to a maximum diameter of .056" at 3500 ft./min. Finer wires are finished at speeds up to 6000 ft./min. The electric spooler has a capacity of 1000 lbs.

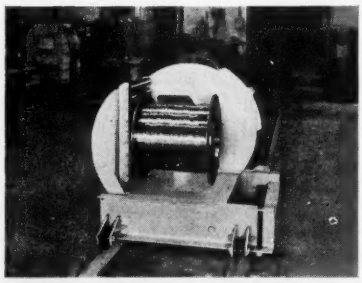
drawing copper wire



FINE WIRE DRAWING MACHINE—8000 FT./MIN.

The new Marshall Richards Type FS.4 is designed to draw wire to 40 B&S. It is a 4-cone machine using from 9 to 21 dies. Both the cones and dies are completely submerged in liquor. It features the famous Marshall Richards Magnetic Spooler which has a capacity up to 40 lbs.

The rugged construction, perfection of materials and workmanship in Marshall Richards wire drawing machines add up to extra long and trouble-free working life. In addition, every detail of design in these machines has been adopted as the result of demonstrated superiority under all conditions of service.



Spool is unloaded by means of a trolley running on rails integral with the steel frame of the Rod-Machine and requiring no lining up on the site. Trolley has a spool tilting device which facilitates unloading, removes danger of damage to spool and minimizes the possibility of industrial accidents.

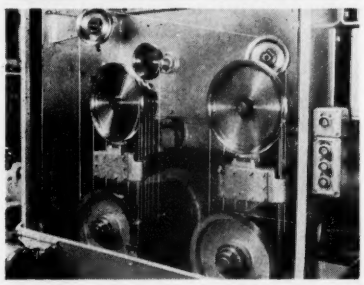
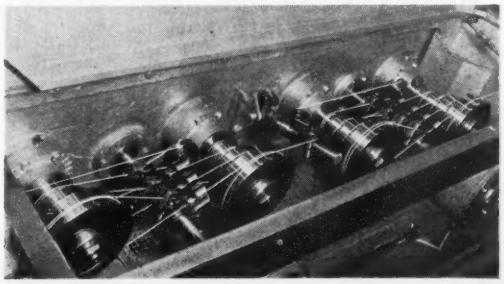


Illustration of capstans and methods of threading on the Marshall Richards Type 13H machine for intermediate-size wires. Steps on cones are in the form of slabs and can be changed separately . . . Wire passes vertically through dies from one step to the next over large-diameter pulleys.



Drawing cones and threading-up method on Marshall Richards Type FS.4 machine. The four drawing cones are arranged in line and are threaded by our patented "Figure 8" system which brings the advantage of no idle cones. Threading is simplified as the operator does not have to pass wire underneath the die holders.

Contact us for full information on faster wire drawing at less cost

MARSHALL RICHARDS MACHINE COMPANY, INC.

1100 BROAD STREET, TRENTON 10, NEW JERSEY
Telephone, Trenton 9478 Telegrams, Marich-Trenton

D R A W O N O U R E X P E R I E N C E

Borax as a Coating for Drawing High Carbon Steel Wire

By Curtis Voigtlander
Superintendent Wire Mills
Union Wire Rope Corporation
Kansas City, Mo.

A discussion on the use of borax as a coating for drawing high carbon steel wire. A paper presented at the Pacific Coast Regional Meeting of the Wire Association, San Francisco, California, June 16, 1950.

THIS is not an article on the use of a lime substitute for this important coating, but it is an article on the use of borax for this purpose.

★ ★ ★

OUR borax tank is made of welded steel, rectangular in shape, large enough to hold three pins of rods, and has a three-inch outlet in the bottom.

★ ★ ★

THE cleaning process is carried on as follows:

★ ★ ★

PATENTED rods are cleaned in one tank, which holds three pins of rods, and patented wire is cleaned in an adjacent tank of the same size. The acid strength used for rods is 4½% by volume of 66° Be. acid at 150° F., and for wire it is 4% strength at 140° F., temperature automatically regulated.

★ ★ ★

WIRE and rods are loaded into the tanks in such amounts and sequences, that a pin is in the acid not over twenty minutes, with one turning of the coils somewhere near the middle of the twenty minutes. The first pin is then washed and placed in the sull rack, which is a steel tank the same size as the borax, but with the bottom drain left open. By the time three pins reach the sull rack, which takes from four to seven minutes, the first pin is transferred to the borax tank and left there until this tank has its three pins, when the first pin is transferred to one of the two flash bakers.

★ ★ ★

SINCE our whole cleaning process is established on a two and one-half minute cycle, the time in the sull rack and in the borax tank is from four to seven minutes.

★ ★ ★

THE temperature of the borax solution is kept at around 190° F. and the strength at ten to eleven ounces per gallon. The flash bakers are held at 600° to 650° F.

★ ★ ★

TESTS for acid strength and borax concentration are made every two hours. In working out the coating mixtures over the last five years, we have tried various mixtures among which are soda ash, tri sodium phosphate, borax and some admixtures of boric acid, mica, etc. We have even run the whole mill for several days at a time, using nothing but sodium carbonate, then on tri sodium phosphate, and, of course, on borax, then on various combinations of two or three of these salts. They all worked, provided we had dry weather. For a long time we used about one-tenth as much tri sodium phosphate as borax in our mixture.

★ ★ ★

SINCE the water used by various mills differs greatly in hardness and in the kind of hardness, it would be well to experiment with the amount of tri sodium phosphate to mix with the borax for the best result to get a soft non-glassy deposit on the wire. We do very well with plain commercial borax.

★ ★ ★

AS the borax solution got older, it became darker from the addition of iron from the wire, and several of us were of the opinion that maybe the deposit of this oxide on the stock was detrimental to the drawing dies. We arbitrarily set up a system of cleaning the iron out of the borax. When the borax mixture cools, the red iron settles to the bottom. Every second week we pump off the clear top solution into the sull rack tank, leaving only a few inches of dark red deposit in the bottom of the borax tank which we wash out and then pump back the clear mixture. Maybe we are too fussy about this, but things seem to be going well as a result.

★ ★ ★

NOW, about drawing the borax-coated wire. It should be thoroughly dried first. We use one kind of soap throughout the whole mill for large sizes, small sizes, dry wire, and the first hole of wet wire, single holers, continuous machines, fast machines and slow machines, and on all kinds of wire. Since we are not advertising any particular make of soap, it is sufficient to state what the makers of the soap tell us and that is that it is mostly calcium stearate with a small amount of soda soap.

(*Please turn to page* 684)

Wire Finishes and Trade Requirements

By C. R. Mehl, President
Industrial Compounds Company
Los Angeles, Cal.

The writer is of the opinion that the future demands of Wire Purchasers will be far more exacting than heretofore. A discussion of wire finishing including the use of borax compounds versus lime coating. A paper presented at the Pacific Coast Regional Meeting of the Wire Association, San Francisco, California, June 16, 1950.

WE have experienced in the past decade tremendous technological changes and new developments in the Metal Working Industries, both in machines and tooling equipment, resulting in greater increased production and better machined products.

* * *

THE Chemical Industry has developed thousands of new organic compounds that have made new products and a great many new Industries possible. The advancement in the process of hydrogenation and polymerization of fats and oils in recent years has provided the Wire Industry with more efficient base materials for lubricants used especially on high speed multiple drawing, as well as better coatings on Wire for subsequent operations.

* * *

WE, who have specialized in Wire Drawing Lubrications, have in the light of modern chemistry, carried on extensive research to endeavor to make available to the Industry new lubricants and coating materials to lower manufacturing costs, as well as provide more satisfactory wire finishes to the Trade.

* * *

THE Wire Division of both the Ferrous and Non Ferrous Metal Industries is also being called upon to produce wire with greater physical properties, also finishes or coatings necessary to conform with the new technical changes in production procedure, and to facilitate in perfecting the finished product.

* * *

AS AN ILLUSTRATION: Consider the present trade demands with regard to Bright Wire. Prior to the War a large percentage of Bright Wire, with the exception of that used for Welding Rod, was principally tinned or galvanized to be fabricated into Ice Boxes, Stove Racks, Baskets, and other hardware. In the past few years this Wire is now being plated for reasons other than the previous shortage of tin.

* * *

THE Electro Plating Industry has in recent years developed new types of bright copper, nickel and zinc solutions. The time required to plate these bright deposits of metal has also been greatly reduced. In this new plating process it is extremely important that the Wire or Rod be smooth and bright. This plated surface will greatly magnify and reveal any surface imperfections in the wire. In the hot tinning process surface imperfections were more effectively concealed. For this reason the Trade demands will be far more exacting in their specifications on this type of Wire or Rod.

* * *

I HAVE for your observation samples of Wire and Rod that were copper or nickel plated. Parts nickel plated were in the same solution for 6 minutes, copper parts 4 minutes. You will readily see very marked differences in the appearance of these wires, due to the surface conditions that prevailed. It is extremely difficult to obtain a good smooth bright wire unless the drafting is heavy enough to remove all traces of the pitted hot rolled surface. Regarding drawing Dies I will mention this later in the paper.

* * *

BASIC Classification of Wire Finishes are as follows:

1—For Extra Bright Wire Finish
2—Cold Heading Finish
3—Spring Wire Finish
4—General Wire Finish
5—Stainless Steel and Various Alloys

* * *

MANUFACTURERS of Springs or various cold heading products have favored a good evenly distributed sull coated rod or wire with a non-sticky lacquer like finish, free of lime streaks, which have a tendency to flake off and either fill or gall guides on spring coiling machines or heading dies on bolt machines. This can also apply to the manufacture of Nails.

* * *

THE sull coating process in the past has not been a complete success. Atmospheric changes, time elements involved, insufficient water quenching, often times resulting in a ferric oxide coating, causing excessive wear on drawing

dies, and no uniformity in finish.

* * *

WE have all recognized an urgent need for an evenly distributed soft metallic oxide coating in addition to the coating provided by the drawing lubricant. This is to aid manufacturers of these products in effectively meeting their unique lubricating problem.

* * *

IN the preliminary Laboratory work several compounds were developed, which revealed excellent possibilities of fulfilling the desired results. However, in actual mill tests the results were not favorable. This is primarily due to the excessive acid carry-over from the Pickling Tanks. These coating compounds could not be effectively stabilized for any period of time, due to these conditions even after washing operations. Inasmuch as lime is a very poor neutralizer of acid, being insoluble in water, and the alkaline hydrolysis in the lime solution serves as the only neutralizing agent is not effective or fast enough to serve this purpose, hence we often times have found a rust condition prevailing beneath the lime coating.

* * *

IN view of this condition it was strongly advocated that before any more development work could be done with reference to coatings a more effective means of neutralizing acids was necessary.

* * *

A NUMBER of alkaline materials were offered by Vendors, which may have served the purpose, and in many cases the use of Borax was found to be very efficient, but we do not believe on heavy extrusion work especially, as the crystallization of Borax on the Wire or Rod will not give the cushioning effect required or the free thread cutting surface desired.

* * *

THE operations in the Cleaning Departments are principally confined to the Pickling, Washing, Lime Coating and Baking of the Rod and processed Wire. In the light of present day developments these operations should be extended to include facilities for neutralizing acids and prepare coatings to obtain the desired finish.

* * *

I ALSO have for your inspection a number of samples of extruded products, on which no other lubricant was used in the drawing operations, other than the coating applied in the Cleaning Department. You will notice a considerable amount of this coating still remains after the extruding and thread cutting operations. These new coatings will draw several drafts without the aid of any other lubricant in the Die Box.

* * *

WHILE we are on the subject of Metal Finishes, some attention should be given towards retaining the lustre of galvanized wire and fabricated products as long as possible. In certain sections of the country, due to atmospheric conditions, a very rapid discoloration of the Wire takes place. Good Bright galvanized fence, netting or barb wire, sold in retail stores has a much better sales appeal than the discolored product. In most plants reasonable protection against this situation can be applied in the water quenching process on the galvanizing frame at very little added expense.

* * *

A MANUFACTURER of Wire Drawing Machinery is inaugurating and equipping Rod Machines in which the use of liquid lubricants can be used as well as the dry type. We believe this is a great progressive step and broadens the opportunity in providing better lubrication, far greater cooling efficiency, which should result in better Die Life, as well as clean wire. Rust prevention additives can be incorporated in these compounds as an added feature. With the advent of Tungsten Carbide Tools water soluble lubricants have replaced many of the sulphur base oils commonly used in the past on heavy machine work, such as broaching, hobbing, thread cutting and deep drawing. It has been our experience that very little lubricant is picked up by the Wire in the intermediate die boxes on multiple drafting, and the use of new types of emulsion lubricants, other than soluble oil, should be very effective in bringing about excellent results in this wire drawing procedure.

* * *

THE Die Department has an extremely important function in producing better finished wire. Regardless how well the Rod has been cleaned and coated a poor Die set-up in a machine will destroy most all of the benefits. In making up a set of Dies for multiple drafting careful consideration should be given as to the proper size, approach, relief angle and bearing. Well polished Dies are also an important factor. Dies for specific finishes and physical properties require different entrance angles and bearings. Dies for Bright Wire require a wider approach angle than that for drawing Rope and Spring. In many cases we have found in multiple drafting operations considerable variations not only in angles and bearings, but also various sizes of Dies, such as R-2 and R-4's in use on the same machine. It is under these circumstances that it is very difficult to produce satisfactory finishes or retain reasonably good Die Life.

* * *

I AM reminded of one particular Wire Mill that had a very efficient Die Department, and all Dies were prepared and segregated according to the specific type of wire for which they were to be used. For Bright Wire Drawing R-5 Dies, 22 to 24 Degree Angles Long Bearing and about a 25 Degree relief angle were used. All Dies were matched and not permitted to remain in operation beyond a 24-hour period, so that they could be maintained in a good polished condition. Dies for High Carbon Spring Wire were made up entirely different so that they ob-

(*Please turn to page* 692)

PROGRAM

Annual Convention of The Wire Association

Lord Baltimore Hotel, Baltimore, Md., October 23-26, 1950

Wire Association Headquarters at the Lord Baltimore Hotel
Will be Open from Monday, October 23, Every Evening During the Convention
Come and Get Acquainted!

THERE WILL BE A REGISTRATION FEE OF $5.00 FOR THOSE ATTENDING THE TECHNICAL SESSIONS AND INFORMAL MEETINGS.

ADMISSION WILL BE BY BADGE ONLY — PLEASE WEAR IT

Discussions Will Be Held on the Papers Presented and These Discussions Will Be Published in the January, 1951, Issue of Wire and Wire Products

WIRE ASSOCIATION PROGRAM COMMITTEE FOR THE 1950 CONVENTION

Lord Baltimore Hotel, Baltimore, Md., Oct. 23-26, 1950

★ ★ ★

Carl E. Johnson
Superintendent, Rod and Wire Mills
Bethlehem Steel Co., Sparrows Point, Md.
GENERAL CHAIRMAN

★ ★ ★

FERROUS DIVISION

John H. Richards, Jr., Chem. Engr.
Apex Alkali Products Co.,
Philadelphia, Pa., Chairman

MEMBERS

Norman T. Nelson, Production Engineer
Bethlehem Steel Company
Sparrows Point, Md.

Robert Peterson, Production Manager
Thompson Wire Company
Worcester, Mass.

R. S. Worth, Manufacturing Manager
Wire Mills Div.
John A. Roebling's Sons Co.
Roebling, N. J.

Tom Girdler, Jr., Superintendent
Beaver Falls Plant
Union Drawn Steel Div.
Republic Steel Corp.
Beaver Falls, Pa.

NON-FERROUS DIVISION

Sidney Rolle, Assistant Manager
Scomet Engineering Co.
New York, N. Y., Chairman

MEMBERS

Manuel Tama, Vice President
Ajax Engineering Corp.
Trenton, N. J.

Matthew J. Donachie, Vice President
Beryllium, Corp.
Reading, Pa.

★ ★ ★

GENERAL ACTIVITIES

N. W. deBerardinis, Manager
Sales Promotion
Firth-Sterling Steel & Carbide Corp.
McKeesport, Pa.

Richard E. Brown, Executive Secretary
THE WIRE ASSOCIATION
Stamford, Conn.

All wire mill men and suppliers are invited to attend this meeting, see how the Association functions and participate in the activities.

Papers selected are preprinted in Wire and Wire Products October 1950 issue in advance of the meeting. Title to papers accepted will be given the Wire Association and duly copyrighted at time of publication. All papers are eligible for consideration for the Annual Medal Award.

Hotel reservations should be made by members of the Wire Association direct to the Secretary.
MAKE YOUR PLANS NOW TO ATTEND AND SEND YOUR RESERVATION PROMPTLY

MONDAY, OCTOBER 23

9:00 A. M.	10:30 A. M.	12:30 P. M.
REGISTRATION	DIRECTORS' MEETING	PROGRAM COMMITTEE LUNCHEON

— The Technical Sessions —

Lord Baltimore Hotel, Baltimore, Md., October 23-26, 1950

MONDAY, OCTOBER 23

Address of Welcome by Fred M. Crapo, President, Wire Association

Afternoon Session — 2 P. M.	Norman T. Nelson Production Engineer Chairman of Meeting	Bethlehem Steel Co. Sparrows Point, Md.
PAPER: "Material Handling at the Rod and Wire Mills of the Western Electric Company"	J. E. Wiltrakis Assistant Superintendent Factory Planning and A. A. Bureau Department Chief Material Handling	Western Electric Co. Kearny, N. J. Western Electric Co. Hawthorne Works Chicago, Ill.
PAPER: "A New Method of Storing Rod"	A. F. Anjeskey Sales Manager	Cleveland Tramrail Div. Cleveland Crane & Engineering Co. Wickliffe, Ohio
FILM ON STEEL MAKING	A short Review of the Production of Steel Including Material Handling of Raw Materials. This will serve as a preview for the inspection trip on Thursday.	

TUESDAY, OCTOBER 24

FERROUS SECTION

Morning Session — 9:30 A. M.	Robert Peterson Production Manager Chairman of Meeting	Thompson Wire Co. Worcester, Mass.
PAPER: "The Use of High Carbon Wire In Pre-Stressing Concrete"	H. Fornerod	The Preload Corp. New York, N. Y.
PAPER: "Wire Testing and Evaluation of the Usual Tests Applied to Steel Wire"	J. E. O'Brien Metallurgical Supervisor Williamsport Plant	Bethlehem Steel Corp. Williamsport, Pa.

NON-FERROUS SECTION

	Sidney Rolle Assistant Manager Chairman of Meeting	Scomet Engineering Co. New York, N. Y.
PAPER: "The Hologen Tin Process for Wire Plating"	W. R. Huey Sodium Products Div. Electrochemicals Dept.	E. I. DuPont de Nemours Co. Wilmington, Del.
PAPER: "The Production and Application of Copper Base Alloy Wire"	W. D. France and Wayne Johnson and W. L. Wells	Scovill Manufacturing Co. Waterbury, Conn.

TUESDAY, OCTOBER 24

FERROUS SECTION

Afternoon Session — 2 P. M.	R. S. Worth Manufacturing Manager Wire Mills Div. Chairman of Meeting	John A. Roebling's Sons Co. Roebling, N. J.

CLEANING AND COATING SYMPOSIUM

PAPER: "Salt Cleaning of Wire"		Hooker Electrochemical Co. Niagara Falls, N. Y.
PAPER: "Straight Line Cleaning and Coating using Lime or Borax"	R. H. Hertzog	John A. Roebling's Sons Co. Roebling, N. J.
PAPER: "Phosphate Coatings"	James Leland	Parker Rust Proof Co. Detroit, Mich.
PAPER: "New Coatings for Bolt and Nut Stock Requiring No Lubricant"	W. Hill, Jr.	Russell, Burdsall & Ward Bolt & Nut Co. Portchester, N. Y.

NON-FERROUS SECTION

Trip through the Point Breeze Plant of the Western Electric Company

— The Technical Sessions —

Lord Baltimore Hotel, Baltimore, Md., October 23-26, 1950

WEDNESDAY, OCTOBER 25

Morning Session — 10:00 A. M.

FERROUS SECTION

Tom Girdler, Jr.
Superintendent
Beaver Falls Plant
Chairman of Meeting

Union Drawn Steel Div.
Republic Steel Corp.
Beaver Falls, Pa.

PAPER:

"Drawing of Stainless Steel Wire"

Kenneth Findlay
Metallurgist

Allegheny Ludlum Steel Corp.
Dunkirk, N. Y.

PAPER:

"Wire for Welding Electrodes"

James Clausen
and
H. E. Sincock

Reid-Avery Co.
Dundalk, Md.

NON-FERROUS SECTION

Sidney Rolle
Assistant Manager
Chairman of Meeting

Scomet Engineering Co.
New York, N. Y.

PAPER:

"The Ox-Off Process for Copper Wire"

A. A. Jones
Manager
Engineering Dept.
and
C. J. Snyder
Engineer

Anaconda Wire & Cable Co.
Hastings-on-Hudson, N. Y.

PAPER:

"The Gas Compression Cable"

Kenneth S. Wyatt
Cable Engineer

Phelps Dodge Copper Products Co.
New York, N. Y.

WEDNESDAY, OCTOBER 25

1:00 P. M.

WIRE ASSOCIATION LUNCHEON

THE MORDICA MEMORIAL LECTURE

J. L. Schueler
General Superintendent
Continental Steel Corp.
Kokomo, Ind.

Title: Design and Manufacture of Woven Wire Fence"

— Presentation of the Wire Association Medal Award for 1949 —

To John H. Corson, Metallurgist, John A. Roebling's Sons Co., Roebling, N. J.

Title: "Welding in the Wire Industry"

WEDNESDAY, OCTOBER 25

4:00 P. M.

Annual Meeting of the Wire Association
Fred M. Crapo, President
Chairman of Meeting

WEDNESDAY, OCTOBER 25

7:00 P. M.

ANNUAL DINNER-SMOKER

N. W. deBerardinis, Manager
Sales Promotion
Firth-Sterling Steel & Carbide Corp.
McKeesport, Pa.

HURSDAY, OCTOBER 26

11:00 A. M.

INSPECTION OF ROD AND WIRE MILL

Bethlehem Steel Co.
Sparrows Point, Md.

Steamer Latrobe will leave Baltimore at 11 o'clock for inspection of historic Baltimore Harbor before proceeding down the bay to Sparrows Point.

Box lunch will be served enroute.

Boat will dock at Sparrows Point at 1:30 where busses will be waiting to transport visitors through the steel plant and to the Rod and Wire Mill.

Upon completion of inspection, busses will be waiting to transport members and guests back to Baltimore.

RESEARCH PAPERS ARE PREPRINTED IN THE OCTOBER ISSUE OF WIRE AND WIRE PRODUCTS

The Discussions and the Mordica Memorial Lecture will be printed in the January 1951, issue of Wire and Wire Products

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Papers not received in time for preprinting will be published in the November and December issues of Wire and Wire Products.

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THE Wire Association is a non-profit organization of wire mill executives, superintendents and foremen. It also includes plant engineers, traffic men, and all others engaged in the production of cold drawn bars, rods, wire, strip, insulated wire and cable, and the manufacture and fabrication of finished wire products, including cold headed, extruded and other cold worked metal products.

THERE are separate divisions for all the separate major interests in the wire industry, steel, iron, brass, copper, alloy, and precious metals, together with divisions relating to drawing, cold working, cold heading, extruding, fabricating, forming, spring making, wire cloth, wire rope, bare and covered electric wire and cable and all other forms of wire and wire products.

★ ★ ★

PURPOSES

ITS specific purpose is to improve production methods and afford a clearing house for ideas on management problems, technical problems, and research work in all phases of practical wire drawing and wire working, and to develop and maintain friendly relations among the members.

★ ★ ★

ACTIVITIES

The Association functions along the following lines:

1. The use of the Association headquarters as a central clearing house for information and data of all kinds which may be of interest to members.
2. The exchange of ideas on processes of production including machinery, technical processes, etc.
3. The establishment and maintenance of friendly relations among the members of the association and the development of sectional and national meetings to discuss matters of mutual interest.
4. Studies of production methods and analysis of production costs.
5. Developments in the use of new materials and new applications of existing materials and by-products.
6. Research and collection of information on personnel management, including such factors as labor turnover, seasonal changes in the demand for employees, wage scales, etc.
7. Standardization and simplification as a means for the effective elimination of waste.
8. Such other subjects as may be determined upon.

THE WIRE ASSOCIATION MEDAL AWARDS

For the Most Meritorious Paper on Wire Manufacture or Fabrication During the Year

— BY A MEMBER OF THE WIRE ASSOCIATION —

MEDAL AWARDS

1934 — EDWARD J. P. FISHER
Metallurgist, Keystone Steel & Wire Co., Peoria, Ill.
Title of Paper: "COLD DRAWN STEEL SPRING WIRE"

1935 — BENJAMIN LEWIS McCARTHY
Metallurgist, Wickwire Spencer Steel Co., Buffalo, N. Y.
Title of Paper: "GRAIN SIZE AND ITS INFLUENCE ON THE MANUFACTURE OF STEEL WIRE"

1936— ROBERT NOTVEST
Chief Engineer, Welding Division, J. D. Adams Mfg. Co., Indianapolis, Ind.
Title of Paper: "STEEL FOR ARC WELDING ELECTRODES"

1937 — BENJAMIN LEWIS McCARTHY
Chief Metallurgist, Wickwire Spencer Steel Co., Buffalo, N. Y.
Title of Paper:
"ABNORMAL GRAIN GROWTH AND THE ANNEALING OF LOW CARBON STEEL WIRE"

1938 — WALTER R. BLOXDORF
Metallurgist, The MacWhyte Co., Kenosha, Wis.
Title of Paper: "WIRE ROPE"

1939 — STANLEY P. WATKINS
Manager, Sales Development, Rustless Iron and Steel Corp. Baltimore, Maryland
Title of Paper:
"THE MANUFACTURE AND USE OF STAINLESS STEEL WIRE"

1940— ROBERT W. SANDELIN
Metallurgist, Atlantic Steel Company, Atlanta, Georgia
Title of Paper:
"GALVANIZING CHARACTERISTICS OF DIFFERENT TYPES OF STEEL"

1941 — CARLETON W. GARRETT
Wire Mill Metallurgist, Jones & Laughlin Steel Corp. Aliquippa, Pennsylvania
Title of Paper:
"A BRIEF DISCUSSION ON THE MANUFACTURE OF STEEL FOR ARC WELDING ELECTRODES"

1942 — LE ROY DEVOE SEYMOUR
Asst. Works Manager, Canada Works, Steel Company of Canada, Ltd., Hamilton, Ontario, Canada
Title of Paper:
"SCHEDULING AND PLANNING THE WIRE MILL FOR WAR PRODUCTION"

1943 — JOHN C. AIKEN
Asst. Supt., Rod and Wire Mills, Jones & Laughlin Steel Corp., Aliquippa, Pennsylvania
Title of Paper: "DRAWING HIGH SPEED ROPE WIRE"

1944 — AUGUST R. ZAPP
Manager, Carbide Division, Firth-Sterling Steel Company, McKeesport, Pa.
Title of Paper:
"HISTORY AND GROWTH OF THE TUNGSTEN CARBIDE DIE"

1945 — MATTHEW J. DONACHIE
Technical Director of Production, Beryllium Corporation, Reading, Pa.
Title of Paper:
"SOME TRAITS AND CHARACTERISTICS IN THE WORKING OF BERYLLIUM—COPPER WIRE"

1946-1947—No awards

1948 — REGINALD S. BROWN
Chief Metallurgist, Rylands Brothers, Ltd. Warrington, England
Title of Paper: "WEAR RESISTANCE OF WIRE FOR ROPE WIRE"

1949 — JOHN H. CORSON
Metallurgist, John A. Roebling's Sons Co. Roebling, N. J.
Title of Paper: "WELDING IN THE WIRE INDUSTRY"

HONORABLE MENTIONS

1935 — L. D. SEYMOUR
Metallurgist, Rod and Wire Dept., Youngstown Sheet & Tube Co., Youngstown, Ohio
Title of Paper: "COLD HEADING WIRE"

1935 — R. A. SCHATZEL
Superintendent, General Research Laboratories, General Cable Corp., Rome, N. Y.
Title of Paper: "HARD AND SOFT COPPER WIRE"

1936 — BENJAMIN LEWIS McCARTHY
Metallurgist, Wickwire Spencer Steel Co., Buffalo, N. Y.
Title of Paper: "PLASTIC DEFORMATION IN WIRE DRAWING"

1937—ROBERT W. SANDELIN
Metallurgist, Atlantic Steel Co., Atlanta, Ga.
Title of Paper:
"A METALLURGICAL STUDY OF THE FACTORS AFFECTING THE QUALITY OF GALVANIZING"

1937 — ALAN B. DOVE
Chemical Engineer, Canada Works, The Steel Company of Canada, Ltd., Hamilton, Ont., Canada
Title of Paper:
"A. C. ELECTRO PICKLING—A BETTER METHOD OF PICKLING"

1938 — RODMAN R. TATNALL
Metallurgist, Morgan Works, Spencer Steel Co. Worcester, Massachusetts
Title of Paper: "RESILIENCE OF SPRINGS"

1939 — JOSEPH A. DOYLE
Vice President, W. S. Rockwell Co., New York, N. Y.
Title of Paper: "HEATING COPPER WIRE BARS"

1940—H. BLOUNT and J. D. WILTRAKIS
Mfg. Engineer, Point Breeze Works, Engineer, Kearny Works, Western Electric Company
Title of Paper:
"DESIGN AND OPERATION OF A NEW COPPER WIRE DRAWING PLANT"

1941 — RODMAN R. TATNALL
Metallurgist, Morgan Works, Wickwire Spencer Steel Co., Worcester, Massachusetts
Title of Paper:
"TIME, TEMPERATURE AND SIZE IN THE HEATING OF STEEL WIRE"

1942—COLONEL FRANK W. BULLOCK
Signal Corps, United States Army
Title of Paper: "THE WIRE INDUSTRY IN WAR"

1943 — E. J. CRUM
General Foreman, Bethanizing and Galvanizing Departments, Bethlehem Steel Company, Sparrows Point, Md.
Title of Paper:
"THE GRAPHICAL SOLUTION OF WIRE MILL MATHEMATICAL PROBLEMS"

1944 —FERNALD S. STICKNEY
Vice President and Chief Engineer, Instrument Specialties Company, Little Falls, N. Y.
Title of Paper: "MAKING 'SPRING-GRADE' BERYLLIUM COPPER WIRE"

1945 — RALPH C. ELLAMS
Supervisor, Electrical Coating Development
Roxalin Flexible Finishes, Inc., Elizabeth, N. J.
Title of Paper:
"SUCCESSFUL FINISHING OF ELECTRICALLY INSULATED WIRE AND CABLE"

1945—D. A. SUTCH, Metallurgist, and B. L. McCARTHY, Chief Metallurgist, Wickwire Spencer Steel Co., Buffalo, N. Y.
Title of Paper:
"REDUCTION OF AREA VALUES AS A GUIDE TO PATENTING"

1946 - 1947 — No awards

1948 — C. A. ZAPFFE, Consulting Metallurgist and M. E. HASLAM, Research Chemist
Baltimore, Md.
Title of Paper:
"EVALUATION OF PICKLING INHIBITORS FROM THE STANDPOINT OF HYDROGEN EMBRITTLEMENT"

1948—CHRISTIAN WITTEVELD
Process and Development Engineer, Bridgeport Brass Company, Bridgeport, Conn.
Title of Paper: "BRASS WIRE PROCESSING"

1949—H. J. GODFREY, Development Engineer and DARTLEY LEWIS, Chief Development Engineer
John A. Roebling's Sons Co., Roebling, N. J.
Title of Paper: "BACK PULL WIRE DRAWING"

1949—E. G. deCORIOLIS, Director of Research and O. E. CULLEN, Chief Metallurgist
Surface Combustion Corp., Toledo, Ohio
Title of Paper: "PROTECTIVE ATMOSPHERES FOR ANNEALING NON-FERROUS WIRES"

GOVERNMENT WIRE PRODUCTION INFORMATION

Density of Solids and Liquids

DETERMINATION of density is a constant and recurrent problem in science and industry. Density determinations may be used to identify substances and to obtain relationships between density, chemical composition, and thermal and mechanical treatments of materials. The National Bureau of Standards has recently issued a circular which describes eleven methods for determinations of the densities of solids and liquids. Included are the hydrostatic-weighing, picnometer, flotation, hydrometer, falling-drop, balanced-column, Boyle's law, electromagnetic, elastic-helix, ice-calorimeter, and volumetric methods.

★ ★ ★

THE Bureau's circular contains many illustrations of the methods used. Circular C487, **Density of Solids and Liquids,** 29 large double-column pages, is available from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., for 20 cents a copy. Remittances from foreign countries must be made in United States exchange and must include an additional sum of one-third the publication price to cover mailing costs.

★ ★ ★

Thermal Expansion of Solids

THERMAL expansion is one of the most important and frequently measured properties of materials. To meet the needs of science and industry for information on this subject, the National Bureau of Standards has issued a new circular, **Thermal Expansion of Solids,** now available from the U. S. Government Printing Office. This circular gives ten methods for determining thermal expansion and presents procedures used to obtain expansion equations and coefficients of expansion of materials.

★ ★ ★

THE methods given include the precision micrometric method, interference method, fused-quartz tube and dial-indicator method, and X-ray method. Also described are methods for determinations of volume changes in metals and alloys during casting. Relationships between thermal expansion, temperature, chemical composition, density, compressibility, specific heat, melting point, atomic weight, and other properties of materials are discussed and illustrated.

★ ★ ★

CIRCULAR C486, **Thermal Expansion of Solids,** 29 large double-column pages, is available from the Superintendent of Documents, U. S. Government Printing

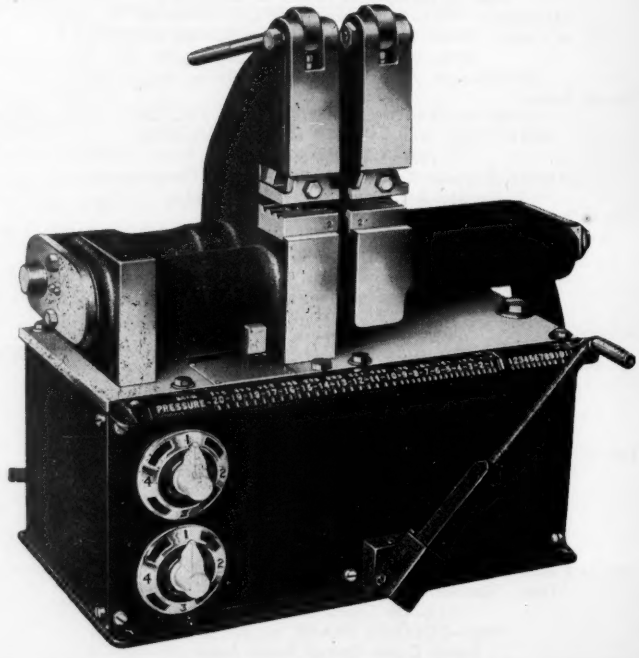
MICROMETER PRECISION MICRO-WELD TRADE MARK REG. U. S. PAT OFF.

MODEL T-L MICRO-WELD BUTT WELDER

Welding capacity .080" to .375 diameter STEEL wire

The Model T-L Welder which is a self-contained unit suitable for various types of Butt welding, is equipped with individual hand clamps, and a single control lever for the spacing operation, applying the upset spring tension, and contacting the welding switch.

This unit can be supplied for either bench mounting, overhead crane, or mounted on 4-wheel truck.



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★ ★ ★

Ten Commendments for Contract Negotiations

COLLECTIVE Bargaining has become so universal in our daily life that the very term can be considered accepted American idiom. Still, there are probably as many interpretations of the term as there are people using it, states a report to members of the **Labor Relations Institute,** New York.

★ ★ ★

IN order to lay down some basic rules for sound and practical contract negotiation procedures, it is necessary to begin with a premise or an interpretation of what is good contract negotiation procedure.

★ ★ ★

THE Institute report sets down a broad but practical goal to shoot at:

"Any agreement, any contract, or any blueprint for desirable labor relations, arrived at in the name of practical job conditions and in the name of real problems confronting management and its own employees, is the result of successful contract negotiating.

"On the other hand, any agreement wrangled or maneuvered in the name of prestige, face saving, special philosophies or special rights, will always be looked upon with suspicion."

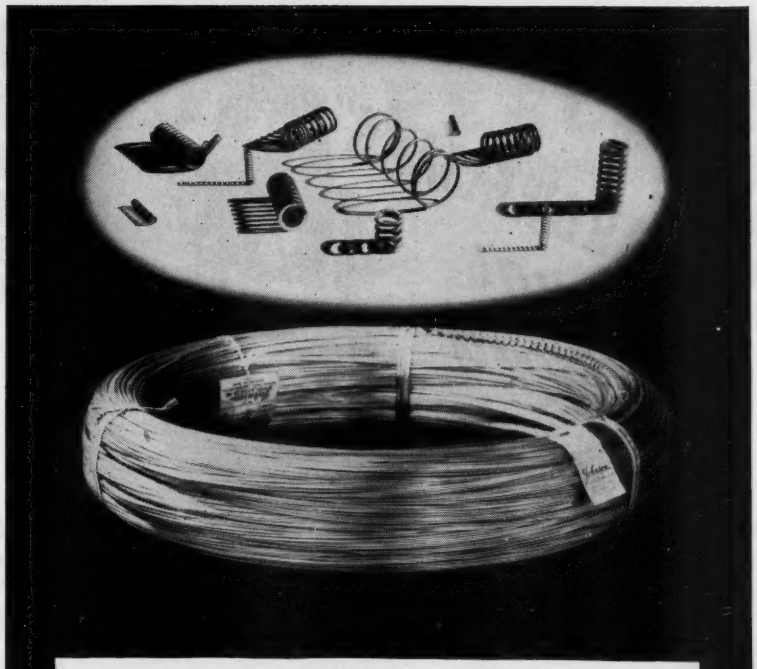
★ ★ ★

TO achieve such a broad goal in a workable union agreement requires (1) a clear understanding of exactly what such a task entails, and (2) sticking close to the rules of sound contract negotiations.

★ ★ ★

IN essence, these rules are simple. Looking at each of them, they seem self-evident. However, there are probably few managements and even fewer union negotiators who have not violated at least one of them.

★ ★ ★



Good News—

Johnson XLO Music Spring Wire now goes to you made from Swedish electric steel rod. Another advance in **Johnson** highly specialized production.

Johnson researchers plus the resources of Swedish steelmakers have developed an electric furnace steel, with closely controlled analysis, which is being used exclusively in **Johnson** Music Spring Wire. The result—more uniformity and added fatigue.

Johnson XLO Music Spring Wire means—uniform cast, uniform tensile, uniform size and self-lubricating surface.—*The reliability of your springs begins with the wire.*

JOHNSON
STEEL AND WIRE COMPANY, INC.
WORCESTER 1, MASS.
New York Philadelphia Cleveland Detroit Akron Chicago
Atlanta Houston Tulsa Los Angeles Toronto

Designed For Application

Of Oval Steel Armor To Electrical Conductors
For Armored Cable Production

Equipped with electric stop-motion which operates upon breakage or exhaustion of supply.

A tension device is provided for controlling the pay-off of covering material, thereby insuring a uniform product.

An adjustable traverse lays the finished product evenly on the windup reel.

Operating and Other Features

- Production dependent upon requirements.
- Standard set of 12 change gears furnished with each machine.
- Serving head speed 1000 R.P.M.
- Driving pulley 8" diameter; 1¾" belt. Speed 471 R.P.M.
- Ratio serving head speed to pulley speed 2.125 to 1.
- Capstan 18" diameter, 3" face.
- Opening through serving head ⅝" diameter.
- Supply spool 9" diameter. 4¾" traverse, 2" diameter hole.
- Maximum power requirement ½ H.P. including power transmission.
- Motor drive furnished upon request.
- Stands can be furnished to take reels as follows:
  30" diameter and up to 13" outside width.
  30" diameter and up to 16" outside width.
- Reels not included with machine.
- Weight approximately 492 lbs.
- Weight crated for domestic shipment approximately 552 lbs.

Complete Details As To The **"WARDWELLIAN"** *Armor Serving Machine On Request*

There are nearly thirty applications for Wardwell equipment, including Braiding, Shielding with Wire, Tape Serving, Yarn Serving, Asbestos Serving, Paper Serving, Armor Serving and Resistance Wire Serving.

WARDWELL
BRAIDING MACHINE CO.
Central Falls
Rhode Island, U.S.A.
Representatives for Europe, British Colonies and Dependencies
JAMES MACKIE & SONS, LTD., BELFAST, IRELAND

THE Institute report goes on to outline ten basic commandments for sound contract negotiations. A free copy of this report may be had on request by writing, on your company letterhead, to the Labor Relations Institute, 1776 Broadway, New York 19, New York.

★ ★ ★

Military Contract Data To be Made Available

NAMES of awarded Army, Navy and Air-Force contracts of $25,000 or more will be made available each week starting July 15th. These can be secured through the Department of Commerce field offices and other offices serving as outlets for procurement information.

★ ★ ★

EACH military department will prepare a weekly synopsis of awards, giving names, addresses and the items to be purchased and the approximate value of each award.

★ ★ ★

Manufacture of Telephone Cable in India

AN industry which is important for development of telephone communications in India is the manufacture of dry core paper insulated telephone cable. At present the requirements in this respect are met entirely from imports. The annual requirements of the Posts and Telegraphs Department for the next ten years are estimated to be of the value of Rs. 70 lakhs. An expert engineer was, therefore appointed last year to investigate the possibility of establishing a Government-owned factory and on examination of his report it has been decided to establish a factory for the manufacture of dry core paper insulated cables.

★ ★ ★

UNDER a twenty-year agreement just concluded, during which time Standard Telephones and Cables Limited, London, are

appointed Technical Consultants to the Government of India, a factory is to be established in India for the manufacture of all of the country's requirements of communication cables. The factory and plant will eventually have an output valued at £750,000 (Rs. 1 crore) per annum. They have also agreed to train Indians who will eventually man the factory and to provide from their own organization key personnel who will assist the Government until the factory is in full operation.

★ ★ ★

New Book on Material Handling

"HANDBOOK OF MATERIAL HANDLING with Industrial Trucks": A 72-page, practical guide for the analysis of material handling operations and the application of the unit-load method with power-operated industrial trucks and accessories, has just been published by the Electric Industrial Truck Association.

★ ★ ★

THIS book, entirely new in text, illustrations, charts and diagrams, together with engineering data, supplants the former materials-Handling Handbook.

★ ★ ★

DIVIDED into four sections, the Handbook of Material Handling with Industrial Trucks contains: (1) The Evaluation of Industrial Truck Handling; (2) Material Handling Management, with sub-sections devoted to the preparation and use of flow process charts, handling operations in production, handling in storage, the use of unit loads in storage, with layouts, commodity and capacity factors, etc.; (3) The Organization of an Industrial Truck System and, (4) Practical Truck Engineering.

★ ★ ★

Single copies of the book are sold for $1.00, with special quantity prices on application. Executive officials of any industry of business, making application on company letterhead to The Electric Industrial Truck Association, Department PR, 3701 North Broad Street, Philadelphia 40, Pa., will be supplied a copy of the Handbook with the compliments of EITA.

★ ★ ★

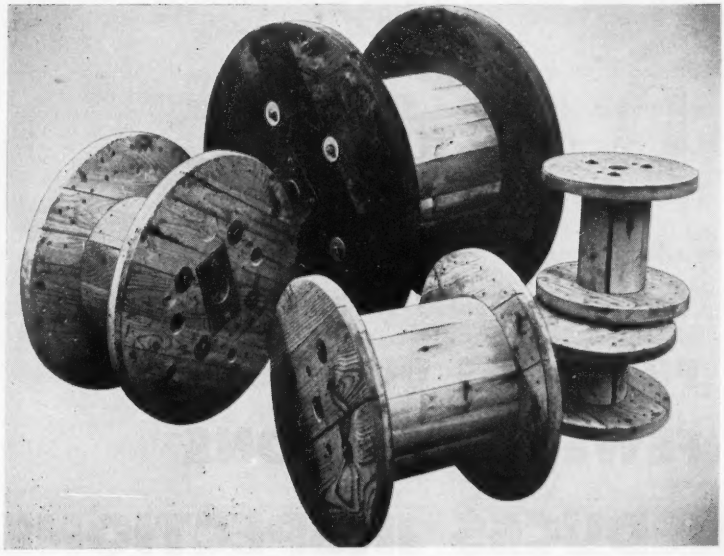
WOOD REELS

RETURNABLE and NON-RETURNABLE

for **CABLE**

ROPE and

WIRE



BRIDGE SHIPPING and SHOP REELS are furnished assembled or knocked-down, made to your specifications. Built to withstand severest handling. Sturdy, strong, low in cost.

ANY SIZE, FROM 12" to 96" in DIAMETER

ALSO, REEL HEADS FOR STEEL DRUMS

The streamlined production methods that give you reels of the finest possible construction at so low a cost, are matched by a unique distribution service that gets them to your plant fast.

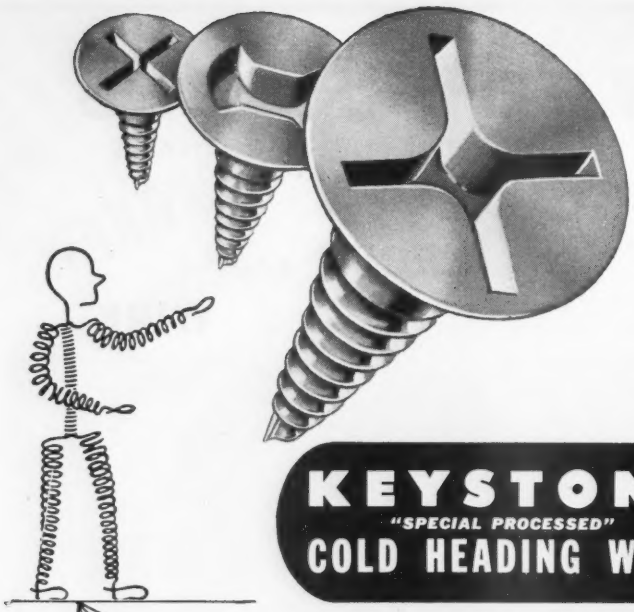
BRIDGE trucks will deliver reels to your door within a radius of 200 miles. Fast N.Y.C.R.R. service will get reels to points as far away as St. Louis in three days time.

Use **BRIDGE** reels for quality and for speedy service.

Send us your specifications and let us quote on costs.

BRIDGE MFG. CO., Inc.

HAZARDVILLE • CONNECTICUT



EXCELLENT FLOW PROPERTIES

PROLONGS DIE LIFE

FEWER REJECTIONS

REDUCES INSPECTIONS

To attain true economy in the production of Phillips head and clutch head screws, an ever increasing number of manufacturers are specifying Keystone's new "special processed" cold heading wire.

This new wire delivers the desired upsetting and die forming qualities with a high degree of uniformity due to its excellent flow properties. Production reports show that die and plug life are often more than doubled . . . finished product rejections are minimized . . . the cost of expensive final inspections is reduced. The superior plating qualities of "special processed" wire further assure a better finished product.

Whatever your industrial wire problems might be, Keystone metallurgical research and testing facilities are available to supply the answers.

KEYSTONE STEEL & WIRE CO.
PEORIA . . . ILLINOIS

Special Analysis Wire, Setting New Standards of Performance

New Handbook on "Centreless Grinding"

THIS important compendium, Centreless Grinding, is published by Arthur Scrivener, Ltd., Tyburn Road, Birmingham, England. It contains 114 pages with 280 figures.

★ ★ ★

THE handbook, which is supplied free to engineers or technicians interested in the process of centreless grinding, is a continuation of the first Scrivener work upon the subject which appeared some four years ago. It is divided into four main sections: (1) dealing with recent modern developments, including wheel crushing, unusual applications, variations in the basic process, and so on, (2) descriptions of the latest types of machines, (3) details of some of the many methods of automatic operation which have been evolved during the past few years, and (4) examples of production obtainable, especially by the use of automatic equipment, every example being accompanied by a photograph of the machine used, a dimensioned drawing of the piece, and another drawing showing the method of introduction between the wheels, in addition to complete technical data respecting stock removal, tolerance, and hourly production figures.

★ ★ ★

THE work contains particulars of the application of the process to the grinding of wire down to .003″ diameter for the watch and clock industries, as well as the automatic grinding of special needles .028″ diameter by means of automatic loading devices.

★ ★ ★

A FINAL accuracy in the order of plus-minus .0001″ is obtainable on work ground by this method, and in the case of simple cylindrical pieces the production obtainable reaches figures which to anyone previously unacquainted with the system would appear to be quite fantastic, such as the one quoted on page 92 of 25,000 ground pins per hour.

★ ★ ★

Outstanding Personalities of the Wire Industry

New Research Man for Apex Alkali Products Co. Seymour Halbert

AFTER graduation from the Philadelphia College of Pharmacy and Science (top 25% of his class), Mr. Halbert's experience has been in the chemical field—starting with his own chemical lab in 1934 and continuing on with the government as Chief Technician in the Dept. of Health in Camden, N. J. From there, a period of about four years in the army in the same capacity and on to Bower Chemical as analytical chemist—then to better jobs with Bisbee Linseed and after their liquidation to Frank R. Gunn Co.

★ ★ ★

NOW that Mr. Halbert is with Apex, his work will be in the capacity of consulting and analytical chemist. While most problems are handled by Apex's men on the spot, Mr. Halbert will be available to give that additional time and effort that are sometimes necessary, in keeping with the Apex policy of rendering technical service to their customers.

Seymour Halbert, Research, Apex Alkali Products Co., Philadelphia, Pa.

★ ★ ★

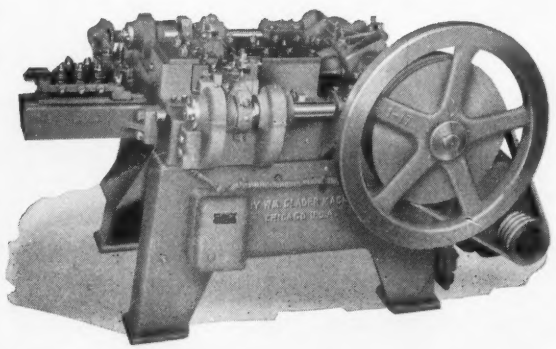
MR. HALBERT'S hobby is a laboratory in his home, where he conducts experiments and does research work in micro-chemistry.

★ ★ ★

New Officers for Broderick & Bascom Rope Company

THE BRODERICK & BASCOM ROPE COMPANY has acquired the entire stock interest of the Broderick family, and John K. Broderick and Arthur L. Broderick have retired as President and Vice President, respectively, and as directors. **Charles E. Bascom** has been elected President of the company and **Joseph H. Bascom** has been elected First Vice President

GLADER HIGH SPEED WIRE NAIL MACHINE



MACHINE ARRANGED FOR INDIVIDUAL MOTOR DRIVE

High tonnage output, and low maintenance costs, have resulted in Glader Machines being accepted as standard equipment in every large nail mill built in the United States in the past twenty years.

Glader Machines are operating in most of the wire producing mills throughout the world.

These machines are made in eleven different types and sizes. This enables us to cover the range of sizes of nails produced with the greatest efficiency.

For further information please address,

WM. GLADER MACHINE WORKS
210 No. Racine Ave.
Chicago 7, Illinois

Export Dept.: 122 E. 42nd Street, New York 17, N. Y.

and Secretary-Treasurer. These officers and **J. F. Hedding** of Pittsburgh constitute the new Board of Directors.

* * *

THE Bascoms will continue in active management of the rope company which will celebrate its 75th anniversary next year. The business was started by Joseph D. Bascom and John J. Broderick as a partnership in 1876 and was incorporated in 1882. Charles E. Bascom has been connected with the company for 48 years and for 30 years has been Secretary-Treasurer. Joseph H. Bascom joined the organization 9 years ago and has been Production Manager in recent years. As son and grandson of Joseph D. Bascom, cofounder, the Bascoms represent the second and third generations engaged in direction of the company's affairs.

* * *

IN addition to the home plant in St. Louis, Broderick & Bascom Rope Company, an important independent in the wire rope industry, has factories in Peoria, Seattle and Houston. Branches and warehouses are also located in New York, Chicago, Los Angeles, San Francisco and Portland, Oregon.

* * *

Chester Bland Elected Director of Leland Electric Company

ELECTION of **Chester Bland** to the board of directors of the **Leland Electric Company,** Dayton, Ohio, is announced by G. Ernest Robertson, president.

* * *

MR. BLAND is president of The Ohio Electric Mfg. Co., Cleveland manufacturer of electric motors, lifting magnets, hoists, and nail making machines. He is also president of the H. P. Townsend Mfg. Co., Hartford, Connecticut, manufacturer of second-operation automatic machines and woodscrew machines.

* * *

J. M. Bertotti Made Assistant Sales Manager by Carboloy

J. M. BERTOTTI, for the last 4 years manager of training, **Carboloy Company, Inc.,** Detroit, has been named assistant sales manager, and **R. G. Brierley** has been appointed manager of training, according, to **K. R. Beardslee,** Vice President.

* * *

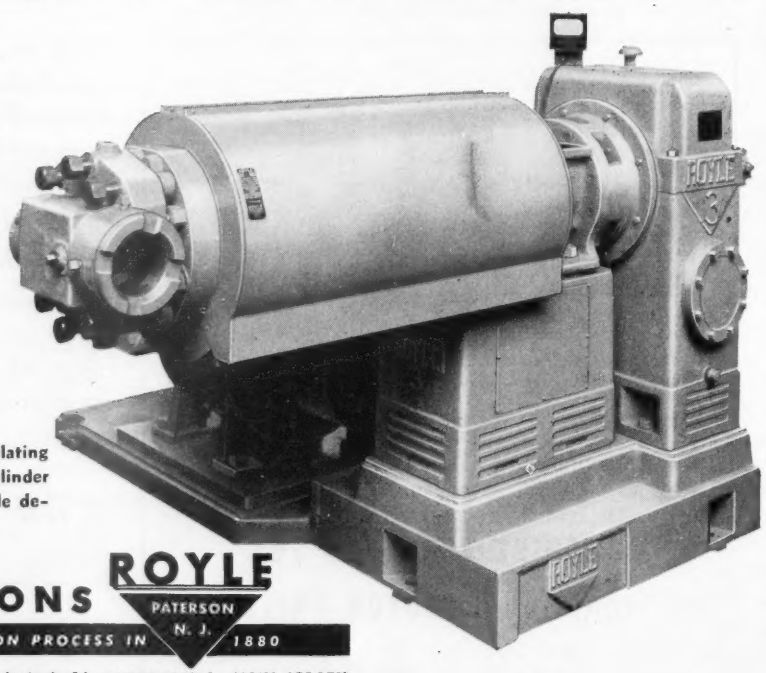
MR. BERTOTTI joined Carboloy in 1943 after several years in both industry and education, including tooling work at the Ford Motor Company and the Hudson Naval Ordnance Plant. His duties will include sales and training work with Carboloy's direct field force, and the distributor salesmen of Carboloy's authorized distributors.

* * *

MR. BRIERLEY joined the Carboloy organization five years ago. As manager of training, Mr. Brierley will be responsible for the

ROYLE *for WIRE INSULATING*

- **Continuous Vulcanizing Machines for Rubber Wire Insulation**
- **Plastic Wire Insulation Machines**
- **Strainers • Cooling Troughs**
- **Light Wire & Cable Capstans**
- **Motorized Take-Ups**
- **Temperature Control Units for Extrusion Processes and other industrial uses**



ROYLE # 3 Plastic Wire Insulating Machine. Double extended cylinder enclosed in insulating jacket, side delivery head.

JOHN ROYLE & SONS — ROYLE PATERSON N. J. 1880

PIONEERED THE CONTINUOUS EXTRUSION PROCESS IN

London, England — James Day (Machinery) Ltd. — REgent 2480
Home Office — J. W. VanRiper — SHerwood 2-0262
Akron, Ohio — J. C. Clinefelter — JEfferson 3264
Los Angeles, Cal. — H. M. Royal, Inc. — LOgan 3261

PATERSON 3, NEW JERSEY

supervision of all customer instruction courses in the use and maintenance of both carbide cutting tools and dies, and of sales trainee instruction.

★ ★ ★

Coons Advanced by A. S. & W.

PERRY T. COONS, veteran of 40 years of sales service with **American Steel & Wire Company,** has been made assistant to vice president-sales.

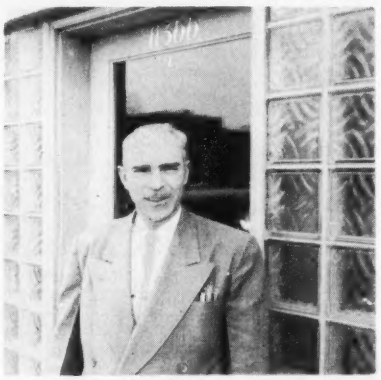
★ ★ ★

H. M. FRANCIS, vice president-sales, also announced that the wire rope and construction materials division of the company, headed for 14 years by Mr. Coons, will be split into two separate sales units. **M. E. Capouch** was named manager of the construction materials sales division and **E. T. Eggers** manager of the wire rope sales division.

★ ★ ★

Holden Opens New Plant In Detroit

THE A. F. HOLDEN COMPANY, metallurgical engineers and manufacturers of heat treating salts and pot furnaces, has officially opened its new plant at 11300 Schaefer Highway, Detroit 27, Michigan.



A. F. ("Art") Holden, Pres., A. F. Holden Co., Detroit, Mich.

★ ★ ★

MANUFACTURING will be carried on here and executive offices have been transferred from the New Haven 8, Connecticut, plant, at which eastern plant, however, manufacturing and service operations are still being continued.

★ ★ ★

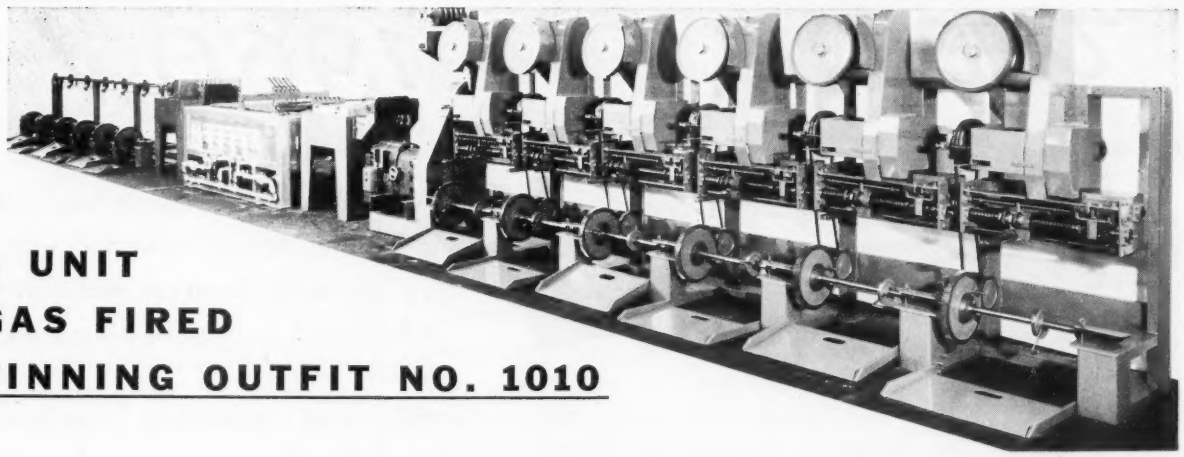
Standard Varnish Works Appointment

ERNEST N. FIELD has been appointed a technical sales representative for **Standard Varnish Works,** New York, it has been announced by Mr. Carl Bauer, Industrial Sales Manager. Mr. Field's activities will be concentrated in the Connecticut territory.

★ ★ ★

A GRADUATE of the University of Alabama and Wesleyan University, Mr. Field has had wide experience in the industrial finishes field.

★ ★ ★



6 UNIT
GAS FIRED
TINNING OUTFIT NO. 1010

Send for information on the following:

WIRE ANNEALING, TINNING and GALVANIZING OUTFITS

MULTIPLE or SINGLE UNIT WIRE TAKE-UPS

FINE WIRE DRAWING MACHINES

MAGNET WIRE ENAMELING EQUIPMENT, INCLUDING

PRE-ANNEALERS, SYNTHETIC ENAMEL APPLICATORS and CIRCULATING SYSTEMS

COTTON, GLASS-FIBRE and TAPE COVERING MACHINES

EST. 1855 AIMCO INC. 1919

"American" INSULATING MACHINERY COMPANY

REG. U.S. PAT. OFF.

517 West Huntingdon St.
Zone 33

PHILADELPHIA PENNSYLVANIA U.S.A.

Detroit Steel Appointments

H. V. CLARK, Vice President in Sales, **Detroit Steel Corporation,** has announced that as of July 1st, **J. M. Gillard** has been made Manager of Sales, Wire and Wire Products and **Tom R. Adams,** has been advanced to Sales Manager of the Detroit District Office. Mr. Gillard was formerly Sales Manager for the Detroit District and Mr. Adams was Toledo District Manager.

★ ★ ★

Electric Auto-Lite Expanding Industrial Wire Sales Program

EXPANSION of industrial wire facilities and reorganization of the industrial wire sales program of **The Electric Auto-Lite Company** has been announced by **D. M. Skirying,** general sales manager of the Wire and Cable Division.

★ ★ ★

WITH the new Hazelton, Penn., plant of the company supplementing the wire production at the Port Huron, Mich., plant, Auto-Lite is in an improved position to service industrial accounts with all types of wire.

★ ★ ★

PRODUCTION from the Hazelton plant has provided faster service for customers in the East. In addition, the company has established new warehousing facilities for speedier service.

★ ★ ★

Art H. Howard Elected Electric Club Prexy

ART H. HOWARD, genial Vice President of Tri-State Supply Corporation, has been elected President of the Electric Club of Los Angeles. Other officers elected were: **John L. Tindale,** Anaconda Wire & Cable Co., 1st Vice President, **Ivan L. Bateman,** Los Angeles Department of Water & Power, 2nd Vice President, **Douglas G. Kendall,** Square D Company, 3rd Vice President and **Carlisle Bailey,** Newbery Electric Corporation, Secretary and Treasurer.

★ ★ ★

G. I. Bottcher, Chief Engineer, Allegheny Ludlum

APPOINTMENT of **George I. Bottcher** as chief engineer of **Allegheny Ludlum Steel Corporation** has been announced by **Emil Kern,** vice president in charge of engineering. Simultaneously, Mr. Kern announced appointment of **J. F. Chapman,** and **R. E. Smith** as assistants to the chief engineer. All three appointees will be headquartered in the company's general offices at Brackenridge.

★ ★ ★

Republic Steel Corp. Appointments

MANAGEMENT personnel changes in the pressed steel division, **Republic Steel Corp.,** Cleveland, include: **Oscar S. Swanson,** superintendent, Cleveland plant, Truscon Steel Co., named works manager, Niles Steel Products Division, Niles O., and succeeded at Cleveland by **Frank F. Malcher. J. Carl Reik** succeeds Mr. Malcher as works accountant for the entire pressed steel division.

★ ★ ★

DESIGN FOR 1960 !

An acid resisting hairpin hook utilizing Monel Metal, designed with an 1/8" extra thickness of metal in the submerged portion to permit a corrosion rate of .012" per year and still have adequate mechanical strength after 10 years of service. Complete engineering data available on request.

THE LEWIS WELDING & ENGINEERING CORP.

Engineers · Designers · Fabricators · Machinists

BEDFORD · OHIO

Keystone Makes Changes in Sales Office

FORD P. SCHUSLER, Industrial Sales Manager of the **Keystone Steel & Wire Company,** has announced the promotion of **G. Wayne Bruce** to industrial sales representative in lower Michigan. Effective immediately Mr. Bruce will take charge of sales and distribution of industrial products in that area, with headquarters at Grand Rapids.

★ ★ ★

AT the same time Tom Maston will take charge of Keystone Steel & Wire Company industrial sales in Indiana (excluding the Lakeshore area) and Southwestern Ohio including Cincinnati. His office will be in Sheridan, Indiana, north of Indianapolis.

★ ★ ★

Made Technical Director of Plastics and Resins

APPOINTMENT of **Clayton F. Ruebensaal** as technical director of plastics and resins for Naugatuck chemical division, United States Rubber Company, has been announced by **John P. Coe,** vice president and general manager.

★ ★ ★

MR. RUEBENSAAL will assume direction of all research, process development and technical service activities pertaining to Kralastic molding powders, Vibrim polyester resins, Marvinol vinyl resins and PQL resins for enamels. He will make his headquarters at the division's main plant in Naugatuck, Conn.

★ ★ ★

George W. Pressell

THE death of **George W. Pressell,** 62, vice-president of **E. F. Houghton & Co.,** industrial lubricants and metal processing products, Philadelphia, occurred suddenly on June 5 at his summer home in Ocean City, N. J.

★ ★ ★

MR. PRESSELL was the oldest Houghton employee in point of service, having started as a messenger boy 47 years ago at $2.00 a week. He had held offices of Chief Chemist, Secretary, 2nd Vice-President, General Sales Manager and Director of Sales. Since 1919 he had been a member of the Board of Directors. He was also President of E. F. Houghton & Co. of Canada, Limited.

★ ★ ★

Chase Brass & Copper Appointment

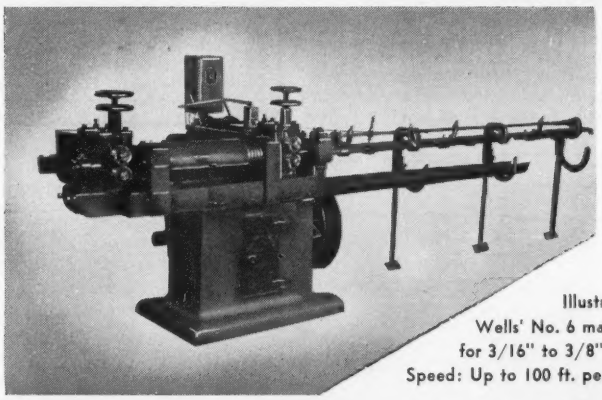
MEAD W. BATCHELOR, until recently executive vice president, Bridgeport Brass Co., has joined **Chase Brass & Copper Co.** He will be located in Cleveland as works manager of the two plants operated by Chase in that city.

★ ★ ★

AD THOUGHT

May we suggest that reading the ads be made a regular habit. And when you write to an advertiser for information, it helps us and identifies your inquiry to say you saw the ad in WIRE AND WIRE PRODUCTS. Will you do this?

Wells' STRAIGHTENING and CUTTING MACHINES



Illustrated:
Wells' No. 6 machine
for 3/16" to 3/8" wire.
Speed: Up to 100 ft. per min.

Other WELLS' machines will handle wire from 1/16" to 5/8 diameter: Precision made of finest steels, all WELLS' machines are rugged, dependable and low in cost, built to long, continuous service. They are the result of 57 years of cumulative experience and may be bought with confidence of satisfactory performance.

WELLS employs no salesmen or agents. All inquiries and orders handled courteously and efficiently by the Home Office at Kenosha, Wisconsin.

Send for Catalog No. 50 describing these and other WELLS' wire working machines. Please address inquiries to:

Frank L. Wells Company

5821 Fifth Avenue

KENOSHA • WISCONSIN

Builders of Wire Working Machinery

A Review of Recent Wire Patents

NO. 2,510,771, METHOD OF PROTECTING METAL SURFACES AGAINST HYDROGEN SULFIDE CORROSION, patented June 6, 1950 by Donald C. Bond, Northbrook, and Michael Savoy, Chicago, Ill., assignors to The Pure Oil Company, Chicago, Ill., a corporation of Ohio.

In carrying out the method, the surfaces are contacted with a hard wood tar distillate to form a coating.

★ ★ ★

NO. 2,510,897, COTTER KEY, patented June 6, 1950 by John A. MacLean, Jr., Winnetka, Ill., and Benjamin Franklin Money, Tulsa, Okla., assignors to MacLean-Fogg Lock Nut Company, Chicago, Ill., a corporation of Illinois.

The key is formed of wire, bent to provide spaced apart bight portions on each leg, which meet, forming fulcrums.

★ ★ ★

NO. 2,511,058, MACHINE FOR THE ROTARY SHEARING OF METAL OR THE LIKE, patented June 13, 1950 by Gerald M. Hambleton, Sr., and Robert G. Heinrich, Rochester, N. Y.

There are 14 claims. The construction includes a pair of parallel arbors, driven in opposite directions, and each carrying a set of cutters, the arbors having bearings on a bed plate and a vertical section extending therefrom.

★ ★ ★

NO. 2,511,274, METHOD OF STRAIGHTENING AND COATING WIRE, patented June 13, 1950 by John Kramer, Waukegan, Ill., assignor to The American Steel and Wire Company of New Jersey, a corporation of New Jersey.

In manufacturing coiled hard-drawn turned iron wire, a method is disclosed for producing a straight set and which comprises passing the wire through an undulating straightening course, heating and coating the wire immediately thereafter by passing the wire through a molten tin bath at a maximum temperature of 650° F. for a sufficient period of time for the wire to attain the bath temperature, and re-coiling the wire, the re-coiled wire having a straight set when uncoiled.

★ ★ ★

NO. 2,511,696, METHOD FOR SPINNING VISCOSE, patented June 13, 1950 by Nicolas Drisch and Robert Priou, Paris, France, assignors to Comptoir des Textiles Artificiels, a corporation of France.

The device is constructed wholly of bent wire.

★ ★ ★

NO. 2,511,700, METHOD OF GRINDING FLAT COIL SPRING BANDS AND A WORK HOLDER THEREFOR, patented June 13, 1950 by Hans J. Duester, Chicago, Ill., assignor to himself and John Major, Chicago, Ill.

For decorating the wire coils, this inventor proceeds by inserting a rigid filler strip into the coil partially to fill and rigidify it, applying upward pressure to the assembled coil and filler strip below the assembly while simultaneously firmly resisting such pressure from above every other convolution of the coil along the edges of the coil so that only the intermediate alternate convolutions are raised above this first mentioned convolutions by the upward pressure, then cutting patterns in the raised exposed flat faces of the intermediate alternate convolutions, and then removing the filler strip.

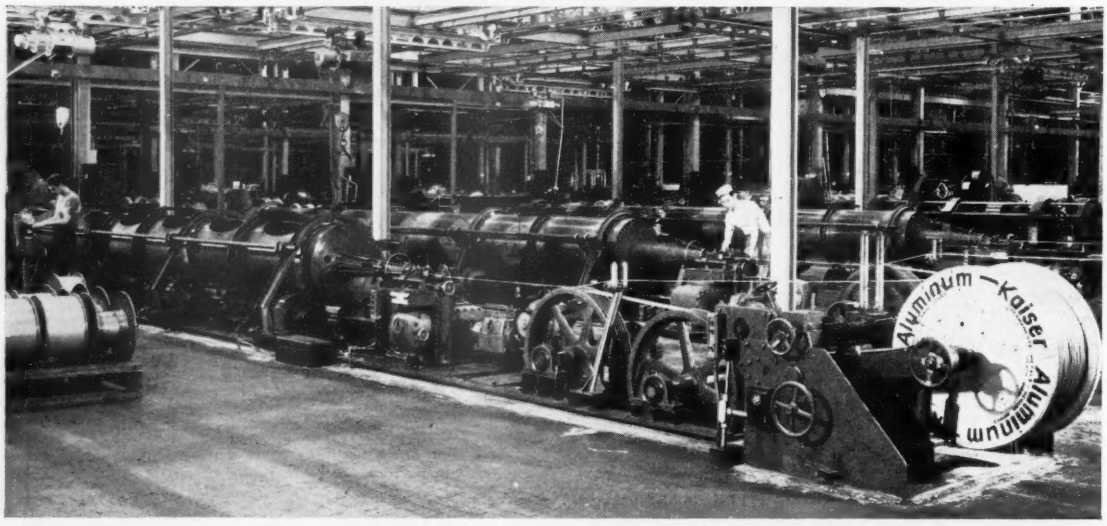
★ ★ ★

NO. 2,511,988, PICKLING PROCESS, patented June 20, 1950 by Henry Francis Myers, Pittsburg, and Otto Albert Proelss, Antioch, Calif., assignors

Complete Description and Drawings of Patents May Be Had for 50 cents, outside the United States and Canada $1.00. Address, Wire & Wire Products, 300 Main St., Stamford, Conn.

NEW 22" SPOOL 750 RPM TUBULAR STRANDER

HYDRAULIC LIFT REEL STAND—INFINITELY VARIABLE TRAVERSE AIR CONTROLLED
DOUBLE DRUM HAUL-OFF WITH LINK BELT P.I.V.—AIR OPERATED BRAKING SYSTEM



HMT
ESTABLISHED 1846 HUGHESVILLE MACHINE & TOOL COMPANY
WIRE & PROCESS MACHINERY

Hi-Efficiency

HUGHESVILLE MACHINE & TOOL CO.
54 ACADEMY STREET
HUGHESVILLE, PA.
Phone: 129-A

to Columbia Steel Company, a corporation of Delaware.

Ferrous articles are pickled for galvanizing by subjecting the articles to the action of a pickling bath of dilute sulphuric acid containing an organic inhibitor to remove scale, oxides, and other foreign matter from the surfaces of the articles without attacking the metal thereof, rinsing the pickled articles, and then subjecting the pickled and rinsed articles to the action of a bath of dilute sulphuric acid containing a small amount of a soluble strongly oxidizing material yielding a nitrate radical on ionization, to uniformly etch the surfaces of the articles to the desired degree.

★ ★ ★

NO. 2,512,517, WIRE CONTAINER HAVING A WIRE STACKING RING, patented June 20, 1950 by Robert A. Bruce, Keosauqua, Iowa, assignor to Barker Equipment Company, Inc., Keosauqua, Iowa, a corporation of Iowa.

An open-work carrying case is provided, formed of wire.

★ ★ ★

NO. 2,512,762, APPARATUS FOR MAKING WIRE TIRE FABRIC, patented June 27, 1950 by Arthur E. Benson, Harold S. Howe, and Crockett Mosshart, Detroit, Mich., assignors to United States Rubber Company, New York, N. Y., a corporation of New Jersey.

This machine is adapted to handle a number of wire cables for imbedding in rubber sheet material.

★ ★ ★

NO. 2,513,164, MACHINE FOR FORMING FLAT COILS OF WIRE, patented June 27, 1950 by Frank A. Genua, Waterbury, Conn.

The construction of this machine is such that the wire may be over bent around the edge portion of a rotatable mandrel so as to receive a predetermined set.

★ ★ ★

NO. 2,513,262, WIRE STRIPPING APPARATUS, patented June 27, 1950 by Louis M. Carpenter and Rudolph G. Roesch, Syracuse, N. Y., assignors to The Eraser Company, Inc., Syracuse, N. Y., a corporation of New York.

Fourteen claims are in this patent to a machine which includes a cylindrical body of abrasive filaments arranged with the filaments extending longitudinally of the body and forming at one end of the tool an annular abrasive and flexible working end face of the tool normally lying in a plane normal to the tool axis. There is also a platen arranged about the tool axis and to support said platen for the passage of a length of insulated wire laterally of the wire between and in contact with this platen and the tool face for stripping of insulation from the wire by the tool face.

★ ★ ★

New Bulletin on Beryllium Copper

THE BERYLLIUM CORPORATION, Reading, Pa., has issued the first of a series of technical data sheets entitled "Beryllium-Copper Technical Bulletin." It is designed to supply engineers with factual information on the alloy. This first issue covers Berylco 165 strip. For a copy of this and for future issues, please write to the Beryllium Corporation.

★ ★ ★

Copper Anodes Available from Stock in Middle West

THE HANSON-VAN WINKLE-MUNNING COMPANY, Matawan, New Jersey, announces that arrangements have been completed for their Anderson, Indiana plant to fabricate rolled copper anodes. Shipments can be made from stock in any reasonable quantity and size anode, assuring immediate delivery.

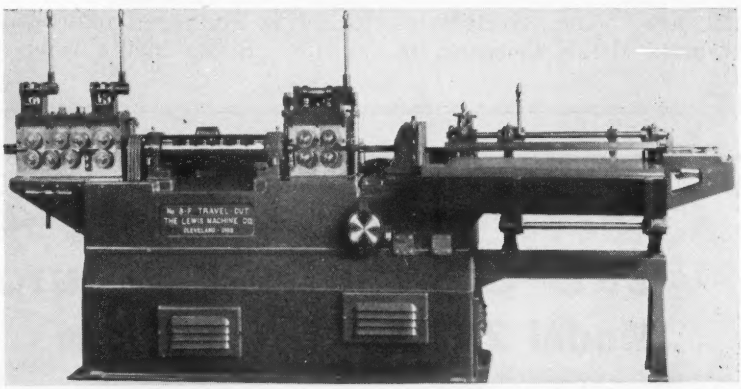
★ ★ ★

ELECTROPLATING plants in the West are invited to take advantage of this service by sending inquiries to the nearest local H-VW-M office or to the Hanson-Van Winkle-Munning Company, Anderson, Indiana.

★ ★ ★

CUT YOUR CUTTING COST WITH

LEWIS TRAVEL-CUT



Wire Straightening & Cutting Machines

The simplicity of design and rigid construction of the Lewis Travel-Cut makes it well suited for the most severe high-production requirements. This machine feeds the wire from the coil, straightens, gauges to accurate length, and cuts while in motion thus producing uniform diameter rod free of arbor swell and feed roll marks. It is particularly adapted to precision work on bright finished steel, brass, aluminum, stainless, and alloy wire. This method of cutting is also very efficient for short lengths such as welding rod, special bolts, etc., and increases the over-all efficiency approximately 20% over the conventional type of cut-off.

Machines built in various sizes to handle from 1/16" up to 3/4" diameter, and 1/16" to 5/8" square or equivalent area in hexagon and flat.

Exclusive Representatives

EAST: Penn Machinery Co., 117 North Third Street, Philadelphia 6, Penn.

MIDDLE WEST: Steel & Wire Machinery Co., 1017 Helmsdale Rd., Cleveland 12, O.

CENTRAL: Moslo Machinery Co., 2443 Prospect Avenue, Cleveland 15, Ohio.

WEST COAST: Hoffman & Heartt, 3005 So. Grand Ave., Los Angeles 7, California.

CANADIAN: Empire Engineering Co., 11 Wellington St. E., Toronto 1, Ontario.

CONTINENTAL EUROPE: Gaston E. Marbaix, Ltd., Devonshire House, Vicarage Crescent, London S. W. 11, England.

The LEWIS MACHINE Company
3441 E. 76th Street, Cleveland 4, Ohio

Also agents in Paris, Stockholm, Rotterdam, Brussels, Zurich, Milan, Bombay and Melbourne

New Reynolds Cable Mill, Dedicated

A MODERN $3,000,000 aluminum cable plant with capacity to produce 60,000,000 pounds of electrical transmission line cable yearly was dedicated July 1 before an audience of 18,000 people at which the featured speaker was United States Senator **Lister Hill.**

* * *

Wire Drawing Department. * * *

THIS new plant, erected by **Reynolds Metals Company,** is alongside its aluminum reduction plant, sheet and foil mills. It is housed in an aluminum building 860 feet long containing 145,000 square feet of floor space.

* * *

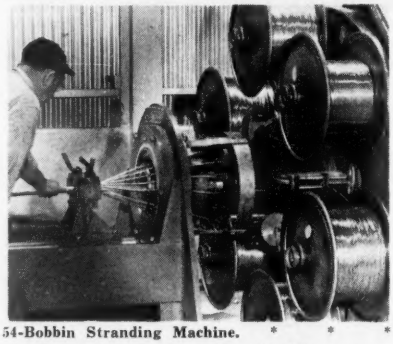
NEW redraw rod equipment at the plant is supplemented by five 10-die and one 7-die tandem wire-drawing machines which operate at high speeds in reducing the 3/8-inch diameter redraw rod to wire of the size desired, reducing the rod to 0.0772-inch diameter wire in a single run through the machine at a speed of 5000 feet per minute.

* * *

THERE are also 19 single-layer 7-bobbin stranding machines, a single-layer 12-bobbin machine, and a multi-layer 54-bobbin stranding machine. The small units operate at speeds up to 320 feet per minute with the 54-bobbin unit capable of working at 100 feet per minute. Hoists and a complete mono-rail system serve the strander.

* * *

THE new plant also includes special coil wrapping equipment which eliminates the need for conventional wooden reels even when shipping 1000-pound coils. The facilities for chemical, physical, electrical, and mechanical testing in-



54-Bobbin Stranding Machine. * * *

clude a huge tensile testing machine with a capacity of 120,000 pounds for pulling to rupture the largest size cable.

* * *

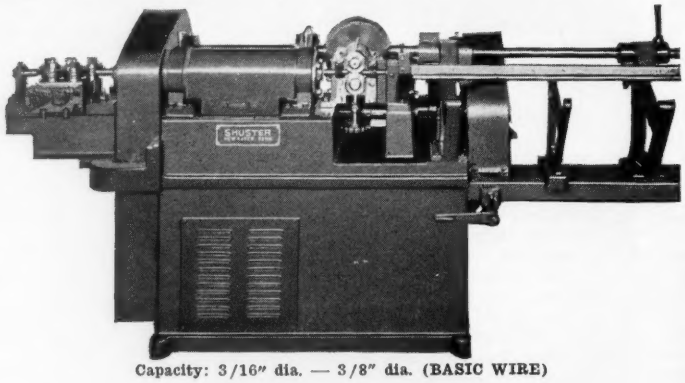
This New, Economical "SHUSTER"
Cuts Costs AND *Accurate Lengths!*

Model 2AB

Automatic

WIRE STRAIGHTENING AND CUTTING MACHINE

This new "SHUSTER"—with its five gear-driven straightening rolls—handles even badly twisted wire with ease. Square and rectangular as well as round wire may be straightened and cut to exact lengths. Other "Shuster" features that assure high speed, quality production are: almost continuous wire travel, rapid cut-off, V-belt motor drive, ball and roller bearings, and extreme rigidity throughout. .025" to 11/16" diameters. Write for details.



Capacity: 3/16" dia. — 3/8" dia. (BASIC WIRE)

Mfd. by METTLER MACHINE TOOL, INC., 132W Lawrence St., New Haven, Conn.

SHUSTER *Automatic* *Since 1866*

WIRE STRAIGHTENING AND CUTTING MACHINES

Representatives in all principal cities and in foreign countries.

Wickwire Spencer to Improve Blast Furnace Facilities at Buffalo

A $300,000 expenditure to improve its two blast furnaces will be part of a substantial program at the River Road plant of the **Wickwire Spencer division of the Colorado Fuel & Iron Corporation,** according to president **Carl W. Meyers.**

★ ★ ★

THE plan is to rebuild all of the stoves in the iron-making furnaces, and to improve the rod mill to give it more capacity. The company also is adopting the use of oxygen in the operation of the open hearth furnaces which eventually should increase the open hearth production by 25%. The plant has four open hearths.

★ ★ ★

MR. MEYERS said the detailed costs of the rod mill improvements have not been worked out on paper, but the improvements are expected to increase capacity by about 20%.

★ ★ ★

New Corporation to Make Products for Fume Control

THE formation of the CATALYTIC COMBUSTION CORPORATION for the purpose of designing and manufacturing catalytic elements for use in fume incinerators and other air pollution control devices, has been announced. The development and application of suitable catalysts for fume elimination is a result of a joint research project carried on during the past five years by Messrs. **R. J. Ruff,** President, Michigan Oven Company, Detroit, and **H. R. Suter,** Associate Director of Research, Wyandotte Chemicals Corporation. A description covering the extent of application of the process was given recently in a paper "Catalytic Combustion of Hydrocarbon Vapors," presented before the U. S. Conference on air pollution.

★ ★ ★

ADMINISTRATION of the pending Suter-Ruff patents on catalytic incineration will be under control of the new company. Catalytically active elements will be supplied to manufacturers of industrial ovens, furnaces, air pollution control and other production machinery for incorporating into complete processing equipment. Manufacturing facilities have been leased in Wisconsin and production equipment installed. Sales are being handled through the company's headquarters at 4544 Grand River, Detroit 8, Michigan.

★ ★ ★

OFFICERS of the company are **R. J. Ruff,** President, **H. R. Suter,** Vice-President, and **N. C. Ruff,** Secretary-Treasurer.

★ ★ ★

Hydraulically Operated **TRAVERSE REELS**

FOR FLAT WIRE AND NARROW STRIP

• The self-contained, compact SECO Traverse Reel has smooth, powerful hydraulic operation — at speeds from 150 to 600 feet per minute.

PERFECT SPEED CONTROL from zero to top running speed through flow control.

ACCURATE TENSION CONTROL through pressure regulation.

Built in sizes for coils weighing up to 600 lbs., for round or flat wire. Unit shown occupies floor space 24" x 42". Modifications in design and construction to meet specific requirements.

WIRE SPOOLERS

Single and Multiple Type

Speeds Up To 4,000 feet per minute

STEEL EQUIPMENT CO.

SECO 2890 EAST 83rd STREET CLEVELAND 4, OHIO

Nail Machine Redesigned for Greater Efficiency

REDESIGN of its line of nail making machines is announced by **Black Nail Machine Division of The Ohio Electric Mfg. Co.**

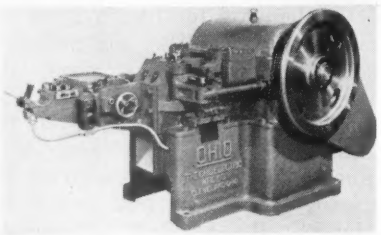
★ ★ ★

THE manufacturer states that Black nail machines are the only machines built that incorporate an adjustable-fulcrum feeder linkage which permits the operator to change the length of the nail while the machine is operating. This eliminates stopping and starting the machine to obtain the desired nail length. Other unusual features are the two-plane wire straightener, automatic cutoff switch that stops machine when wire runs out or snarls, interchangeable cutoff dies, and adjustable header tool to produce nail heads of different diameters and thicknesses.

★ ★ ★

OFFERED in a wide variety of sizes ranging from the small model AA for producing wire brads up to model JA for making ⅜ x 12" spikes, the new Black nail machines are of heavy-duty steel construction throughout. Enclosed type design reduces noise to a minimum and eliminates the hazard of moving parts.

★ ★ ★



The Redesigned Nail Machine announced by Black Nail Machine Div., Ohio Electric Mfg. Co., Cleveland, Ohio.

ALL parts in the crank housing are lubricated by pressure or spray supplied from an 8-gallon oil sump. Oil filters may be incorporated in the lubrication system, if desired. Cams and followers are lubricated by spray while small and large-end bearings of the alloy steel pitman are lubricated by pressure. Cutter slides are grease lubricated and have individual reservoirs holding a supply of lubricant for an 8-hour production run.

★ ★ ★

THE forged alloy steel crankshaft, fully counter-balanced to minimize vibration, runs in four interchangeable pressure-lubricated bearings. Bearings have a 6:1 factor of safety and are designed for 30,000 hours of life, the equivalent of 5 years' service under average conditions.

★ ★ ★

FOR operation on 3-phase current, Black nail machines are normally supplied with interchangeable, dual-winding motors for 220 or 440 volts. Safety push-button controls are standard.

★ ★ ★

FULL information on productive capacity, dimensions, prices,

The SPECIALISTS in
Wire - Straightening and Wire - Cutting!

Diameter Range — 1/16" to .005"

PRECISION - Our Motto

DON'T hesitate to call on us when you are confronted with wire-straightening problems involving close tolerances and absolute accuracy. For seventeen years we have specialized in straightening and cutting all gauges of fine wire, hard or soft, ranging in diameter from one-sixteenth of an inch down to five-thousandths of an inch. We employ gun-barrel accuracy in straightening lengths from one inch to ten feet or any fractional part thereof. Ends cut absolutely clean without burrs.

ASK ABOUT OUR UNEXCELLED FACILITIES FOR CLEANING AND POINTING WIRE ALREADY STRAIGHTENED AND CUT.

ALL TYPES OF WIRE...

- Nickel
- Stainless Steel
- Bronze
- Brass
- Copper
- Alloy Wire
- Music Wire
- Tag Wire
- Florist Wire

Write us today!

Manufacturers of the famous ARMA PAPER CLIP

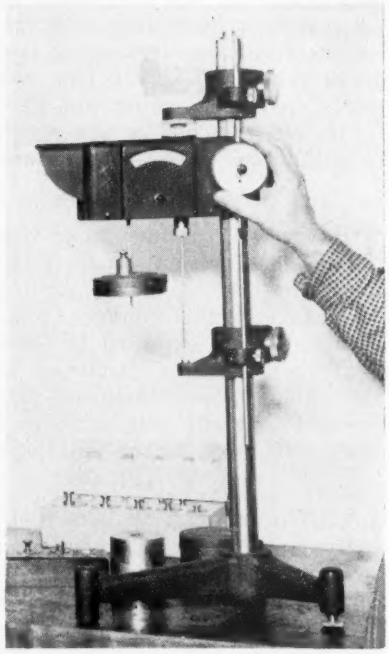
PITTSBURGH CUT WIRE COMPANY
1112-20 GALVESTON AVENUE · PITTSBURGH, PENNSYLVANIA.
TELEPHONE: CEdar 4702

etc., is available on request to the Black Nail Machine Division, The Ohio Electric Mfg. Co., 5900 Maurice Avenue, Cleveland 4, Ohio.

★ ★ ★

New Small Spring Tester

COIL springs up to 10 lb. capacity are checked by means of this Baldwin-Hunter precision tester in the Philadelphia plant of



New Small Spring Tester. * * *

General Electric Company. The tester has a sensitivity of less than 50 milligrams and a weighing accuracy within plus or minus 0.10 percent. Compressed and extended lengths of springs for a given load are accurate within plus or minus 0.001 inch. Baldwin-Hunter spring testers are available from **The Baldwin Locomotive Works,** Philadelphia 42, Pa.

★ ★ ★

New Bulletin on Corrosion Proof Materials and Construction

THE ATLAS MINERAL PRODUCTS CO. announces the publication of their new General Bulletin MCC No. 1. This bulletin briefly describes Atlas' complete line of chemical construction materials, including: corrosion-proof linings, corrosion-proof cements, acid-proof brick and tile, corrosion-proof brick sheathings, corrosion-proof protective coatings and corrosion-proof floors. It also includes handy estimating data. Write to 42 Walnut Street, Mertztown, Penna. for your copy.

★ ★ ★

Ross Engineering Moves Office

ON August 1st the New York office of the **J. O. Ross Engineering Corporation** which for many years has been located at 350 Madison Ave., New York City, moved into its new and much larger quarters at 444 Madison Ave., New York 22, N. Y.

★ ★ ★

Thermoplastic Cable Sheathing Kraft*

the water repellent paper used in

NONMETALLIC SHEATHED CABLE

improves flame tests.

An exclusive product of

Merrimac Paper Co., Inc.

Mills — Lawrence, Mass.
295 Madison Ave., New York City

Manufacturers of other high quality dielectric papers for Tubes, Panels, and Underground Cables.

* Patent applied for.

The New West Moves Ahead

(*Continued from page 653*)

THE West studied its problem—the need for more manufacturing to better utilize its resources—charted its course; drafted a plan of action, and went to work. It is recognized that there is still much to be done, but the goals that were set are not only helping to build the West but are adding strength and security to our entire nation.

★ ★ ★

RESEARCH is the keynote of the planning program. The West has become a huge laboratory for scientific investigation. There's a lot of catching up to do, and you will find active such research programs as the hydrogenation of coal, new mineral developments, new products from steel and wire, atomic research which will make possible important peacetime developments in many industries, the greater utilization of farm products and farm wastes, reclamation planning, oil and gas exploration, new manufacturing research, and other projects that have far-reaching significance.

★ ★ ★

BEYOND the frontier of expanded business developments, the rocket program in New Mexico is exploring the new frontiers of the upper stratosphere, and in the oil industry in the year 1949, the search for new fields below 12,000 feet increased sharply with more than one hundred million dollars being spent on the completion of 232 wells. 32 new fields and 32 new sands or extensions were discovered from deep drilling. A new depth record of 20,521 feet was established in Wyoming, and California also reached a new depth record of 15,530 feet for the state.

★ ★ ★

THERE will continue to be new markets for new products because of the rapidly expanding population in this country. The 1950 Census is expected to show total United States population at 152 million. Some analysts now forecast that our population may reach 200 million by the year 2000.

★ ★ ★

I THINK we may all take justifiable pride in being a part of an industry that plays such an important role in the progress of this nation. The steel industry operates to render a vital service to the entire country, and it has been preparing for the steadily increasing demand for its products. The industry's productive capacity has quadrupled since the beginning of the century, and during this same period United States population has about doubled. The industry as a whole spent $510 million on expansion and improvements in 1949 and this year's capital improvement program is estimated at $468 million.

★ ★ ★

THE United States production of steel in April, 1950, totaled 8,196,500 tons, the highest output ever achieved during that month, and April was the third month in history in which output exceeded 8 million tons.

★ ★ ★

Only HAVEG offers you this practical plan to *permanently* control corrosion of metal finishing equipment:

1. Personal cooperation in the engineering and installation of Haveg equipment.
2. Manufacturing facilities to "tailor-*mold*" Haveg equipment to fit your jobs.
3. Permanent control of corrosion because HAVEG material is resistant to chemicals *all the way through*, not just on the surface.

Thousands of successful installations already made. Many standard shapes available immediately—including tanks, piping, fittings, valves, etc. Quick service on tailor-made shapes. Get more information—no obligation. Send for new Bulletin F-6.

HAVEG CORPORATION
NEWARK 47, DELAWARE
FACTORY: MARSHALLTON, DEL. · TEL. WILMINGTON 3-8884

CHICAGO 11 — 1201 Palmolive Bldg. — Delaware 7-6266
CLEVELAND 14 — 550 Leader Bldg. — Cherry 7297
HARTFORD — 57 Farmington Ave. — Hartford 64250
HOUSTON 6 — 4601 Montrose Blvd. — Jackson 2-6065
DETROIT 11 — 2832 E. Grand Blvd. — Madison 1575
LOS ANGELES 13 — 601 W. Fifth St. — Mutual 8955
SEATTLE 1 — Vance Bldg. — Elliot 0890

THE capacity of the steel industry of this country today is almost 100 million tons—the highest in history. The total steel capacity exceeded by about 10 million tons the combined output of all the rest of the world last year. Our steel making capacity has gained almost 18 million tons since 1940. Only 7% of the world's people live in the United States, but the people of this country have available for their use almost 20 times as much steel per capita as the people who live elsewhere, which is another convincing proof of the success of our American enterprise system.

★ ★ ★

FORECASTING is a precarious occupation, and there is no crystal ball I know of that will show the way ahead, or the answer to some of the large problems that confront our nation today. However, the theme of this regional meeting of the Wire Association is one of Forward Planning, and we can always place statistical dependence on the skill and determination of the American people to keep our country at the top of the ladder, regardless of the size of the undertaking. While there are some uncertain trends in a few industries, the current business headlines are:

The steel industry is setting a fast pace for other industries to follow. Production records have been broken, but the heavy demand for steel and wire products has continued.

Auto production in the first 5 months of 1950 was 20% ahead of the same period of 1949 and new records are being established each week.

The output of household appliances in the first half of 1950 should be well above the first half of 1949.

Construction magazines point to new records in construction volume in 1950—after reaching new heights last year.

Manufacturers' order backlogs have turned up in recent weeks. New orders have been consistently running ahead of shipments.

Business spending for new plant and equipment, which was off for a time, has turned up again.

The National Association of Purchasing Agents reports that business orders in May continued to rise at about the April rate.

★ ★ ★

THERE is always danger in thinking that the days of opportunities for new ideas are passed. How to make both ends meet has been bothering men for centuries. Then somebody invented the zipper. Today zipper manufacturers have developed a business in metal zippers that has reached $70 million yearly.

★ ★ ★

KING GILLETTE was shaving one morning and got the idea of a razor with a removable blade. The results are history.

★ ★ ★

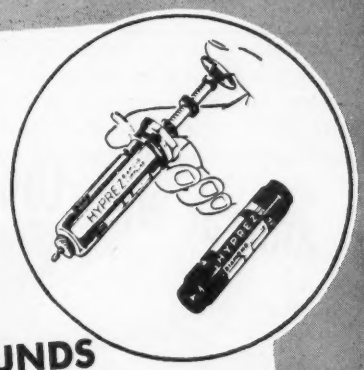
GAIL BORDEN didn't receive the patent on his condensed milk until he was 55 years old. The first plant failed, but he kept on plugging and advertising.

★ ★ ★

WM. WRIGLEY first started selling baking powder and felt he had to give away something to sell it. He tried chewing gum as a premium, and found an entirely new market.

★ ★ ★

faster, finer finishing of WIRE DIES AND TOOLS with HYPREZ DIAMOND COMPOUNDS



A Difficult Die Hyprez Finished To Perfection

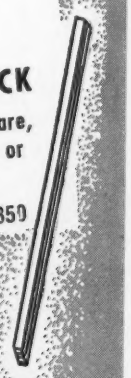
- ✓ Smooth, flawless surfaces
- ✓ Precise shapes and contours
- ✓ Proven time-saving techniques
- ✓ Quick economical results
- ✓ 26 engineered grades
- ✓ From rough to mirror polish
- ✓ 2 unit sizes — 18 and 5 gram
- ✓ Sealed cartridge and applicator gun

Only HYPREZ Can Do a HYPREZ Job!

Write for free HYPREZ LAMINATED LAPPING STICK

Available in 6" length, 1/8" to 3/16" square, and rectangular. Any size may be rounded or pointed for fine detail.

For free demonstration or Hyprez lapping stick write Dept. W-850



HYPREZ DIVISION
ENGIS EQUIPMENT CO.
431 S. Dearborn St. Chicago, Ill.

IN the early days of our country, Eli Whitney invented the revolutionary cotton gin. Americans were so anxious to use it immediately that they broke into Whitney's barn.

★ ★ ★

SIXTY-FIVE HUNDRED television sets were made in 1946. The estimate for 1950 is 4½ million sets, and new television towers are now being built across the country.

★ ★ ★

THE field of electronic research is being put to more and more use in the steel industry, with photoelectric tubes, electronic welders, X-ray gages and new types of controls.

★ ★ ★

THE railroads of today have active research programs and are putting new ideas to work—end to end radio communication; dieselization of motive power; radar equipment for locating breaks in lines; mechanical washers; caricing machines; high speed track; modern freight cars; supersonic reflectorscopes for testing; and many other new projects that are providing safer and faster travel-high-speed transportation for the New West of today.

★ ★ ★

MODERN research programs are also in progress by airlines and trucking companies.

★ ★ ★

THE steel industry of America is great because of its continued program of research in metallurgy, chemistry, and the other basic sciences-building the kind of steel and wire products that this nation must have to go forward. The skill and productivity of American workmen has long been recognized, and faster and more efficient equipment, better working conditions, and new methods of production have helped them hold their world-wide supremacy.

★ ★ ★

YES, we have a wonderful country. There was little progress when things were made by hand-slowly. With the coming of machinery, great changes were made. The initiative of American enterprise.

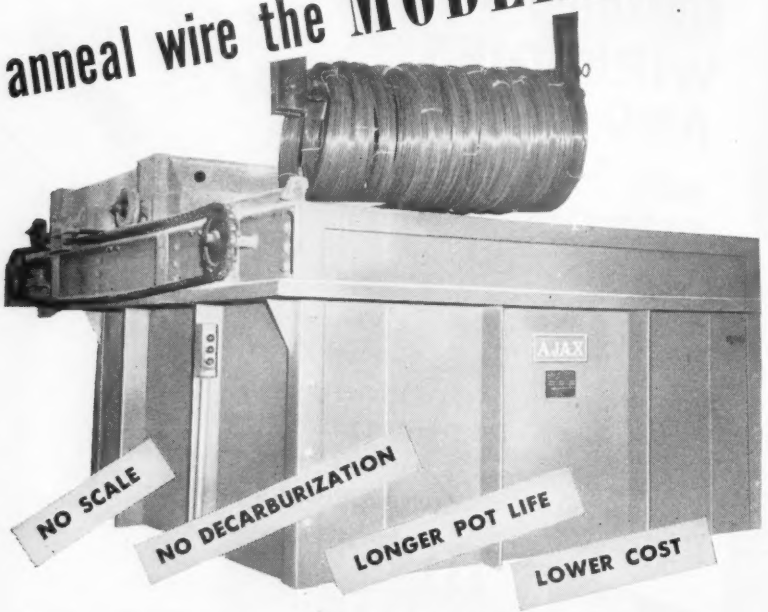
★ ★ ★

THERE had hardly been any important changes in transportation, the making of steel, or other forms of manufacture, for over 1700 years. Then came the American revolution in which we won our freedom of speech, the press, assembly, and religion. Men demanded the right to think and act as they pleased. They wanted a new economic freedom—and in America, the land of opportunity, millions found it.

★ ★ ★

I HAVE tried to give you a brief picture of the New West of today, in helping Karl Baessler build a western theme for this regional meeting. As members of the Wire Association, we are proud of the fine progress that is being made in

anneal wire the MODERN way!



You'll save money, you'll improve efficiency along many lines with the unique Ajax Electric Salt Bath wire annealing method. It requires less floor space, less labor, less maintenance. Heating cycles average less than 20 minutes, even on difficult jobs. There is no scaling, no decarburization, no explosion hazard, none of the bothersome problems entailed with atmosphere equipment. Salt bath treating does the work faster, better, cheaper!

Ideal for annealing low- or high-carbon and stainless steel wire and rod; annealing aluminum, and copper and silver alloys; and for descaling stainless and alloy steel wire in molten salt baths.

AJAX ELECTRIC COMPANY, INC.
Frankford and Delaware Aves. • Phila. 23, Pa.
The World's Largest Manufacturer of Electric Heat Treating Furnaces Exclusively

AJAX HULTGREN ELECTRIC SALT BATH FURNACE

WRITE FOR YOUR COPY!
This 72-page Ajax booklet tells the entire story of salt bath heat treatment as applied throughout modern industry. Ask for Booklet 116.

other parts of the country. In unity there is strength.

★ ★ ★

I WOULD like to leave with you the words of Abraham Lincoln, a great American, spoken some eighty-five years ago:

"You cannot build character and courage by taking away man's initiative and independence. You cannot help men permanently by doing for them what they could and should do for themselves."

★ ★ ★

Lewis Designs Trouble-Free Pickling Hook

A NEW type of long-life pickling hook has been engineered by **The Lewis Welding & Engineering Corp.,** Bedford, Ohio, that is said to offer several exclusive features that add to the hook's life and that protects rods and wire from acid drippings after pickling.

★ ★ ★

THE hook itself is liberally designed and is made of acid-resisting Monel. An extra ⅛" thickness of metal is provided on that portion immersed in the acid to anticipate metal lost through corrosion and still maintain adequate structural strength. The hook is bolted to the load or spreader bar, so that it can be removed and a new low-cost bar attached for replacement when needed.

★ ★ ★

THE load bar is a round seamless tube sealed at the ends, designed to control condensation. A drip trough is fastened to the underside of the tube to carry off any condensate, or drippings, beyond the range of the rods on the hook below it.

★ ★ ★

IN addition, the hook itself is provided with drip holes that will also drain off any water or acid out beyond the suspended rods, effectively preventing drippings falling upon the rods following rinsing and liming. It is well-known that such drippings are responsible for the rust spots that often may be seen through the lime after the coating, which, of course, represents a rough spot on the stock.

★ ★ ★

THE combination of a Monel hook bolted onto the replaceable load bar has greatly reduced the initial cost of hooks to mills. Full details regarding the Lewis Hook may be secured upon request direct to the company.

★ ★ ★

Du Pont Polychemicals Department Announces New Plastic Electrical Insulation

A HIGH quality plastic electrical insulation which will not support combustion has been developed in the laboratories of the **Du Pont Company's Polychemicals Department.**

★ ★ ★

IT is now available in commercial quantities and is being offered to the wire and cable and electrical industries as "Rulan" flame-retardant plastic.

★ ★ ★

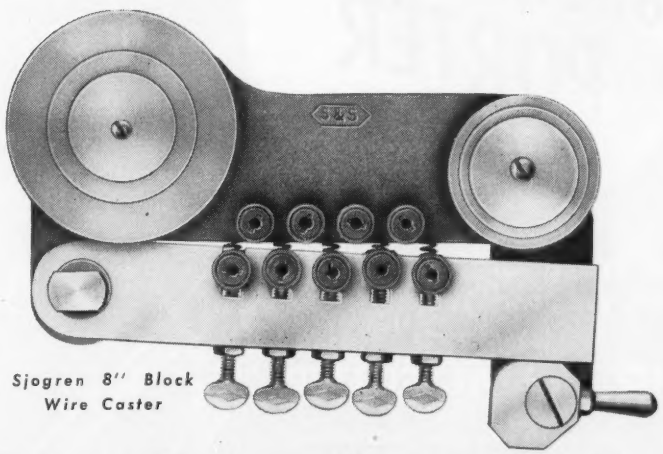
Sjogren KILLERS for Casting Wire

SJOGREN Killers are designed for the job—that of 'casting' wire properly. The 8" block size will handle from .005" to .020" diameters. Other Sjogren killers for larger wire gauges and blocks of greater diameter, having either clockwise or counter clockwise rotation, are made to order.

Used by Wire Men Who Want the Best!

SINCE S&S 1927

WIRE PULLERS • WEDGE GRIPS • JAWS FOR ALL MAKES OF PULLERS AND TESTING MACHINES • CAGE ROLLERS • SWAGING HAMMERS • POINTING DIES • WIRE SPOOLERS



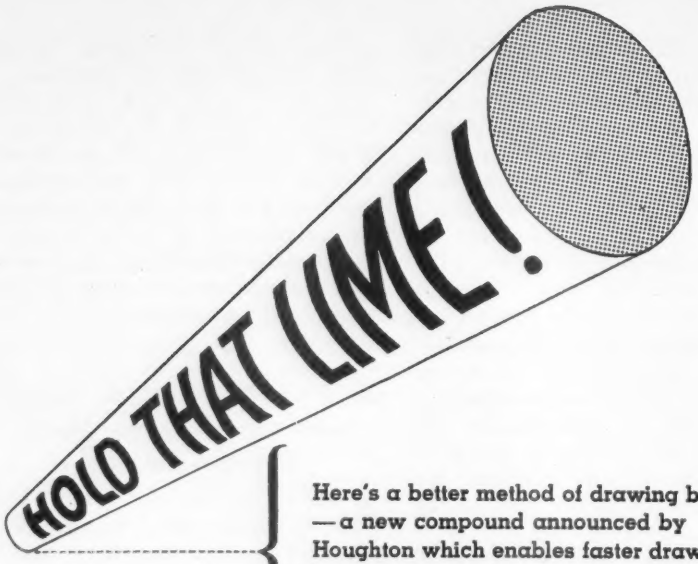
Sjogren 8" Block Wire Caster

SJOGREN TOOL AND MACHINE CO., INC.

Tools for The Wire Industries

14 SWORD STREET, AUBURN, MASSACHUSETTS

Represented in Canada by THE LARSON CO., 98 Wellington St., West, Toronto, Ont.



Here's a better method of drawing bars —a new compound announced by Houghton which enables faster drawing, brighter work and cleaner operation —no lime-encrusted steam lines or tanks. Merely pickle, rinse, immerse in solution of HOUGHTO-DRAW 357 and you're ready to draw. Film is adherent, but readily cleaned. For details, write E. F. Houghton & Co., Phila. 33, Pa.

HOUGHTO-DRAW 357

2 GREAT, NEW PORTER CUTTERS

for cutting extremely hard materials, including stainless steel

PORTER CARBIDE EDGED CUTTER

Another important Porter development for cutting extra hard materials, such as stainless steel rods, wires, pins, etc. Tough carbide edges are firmly brazed to cutting jaws. Stands up under the toughest usage! Pays for itself many times over. #3CE cuts up to 5/16" dia. #4CE cuts up to 3/8" dia.

for cutting hot steel bars, rods, wires, etc.

PORTER HOT METAL CUTTER

An ideal tool for steel mills and fabricating plants. Made of special hot work steel and special heat-treated jaws, for long life under continuous heavy duty with no loss to cutting edge temper.

#3HW cuts up to 5/16" dia. #4HW cuts up to 3/8" dia. Order through your industrial supply house!

H. K. PORTER, INC., 74 Foley Street, Somerville 43, Mass.

WHEREAS flammability has been a characteristic disadvantage of plastics with good electrical properties, tests with "Rulan" have shown that it will not burn after the flame has been removed. Neither will it drip when molten.

* * *

ITS electrical properties are comparable to, although not the equivalent of, those of polythene which is one of the best insulating materials known, particularly in high-frequency electrical applications.

* * *

ALTHOUGH it is still limited in availability, laboratory and field tests point to its wide use as electrical insulation where flammability is a factor, such as insulation for high-voltage hook-up, signal-control, television lead-in, radio feed-back, and flame-retardant line wires, and for neon-sign, multi-conductor control, and high-voltage street-lighting cables.

* * *

Borax as a Coating for Drawing High Carbon Steel Wire

(*Continued from page 656*)

WE have a motorized rotary mixer so that we can mix hydrated lime with the soap. We always have several mixtures of soap ready for the wire drawers' use. One barrel contains regular soap, another barrel has 30% lime and soap, and another barrel contains dry hydrated lime. Each wire drawer can take or make the mixture he has found works the best for his type of machine and wire. Usually soap is put only in the first die box of any machine, even on a ten-hole job. But you know how wire drawers are: sometimes we find some one of them has put soap into 3, 4 or even 5 of the die boxes, but, as you know, wire once soaped will pick up very little additional lubricant.

* * *

IN making furniture spring wire, we skip the sull rack in the Cleaning Department and use a 30% lime mixture in the first die box only of the wire drawing ma-

Diamond Distributors Inc.

MANUFACTURERS OF

PRECISELY GRADED

DIAMOND POWDER

SERVING INDUSTRY'S

SPECIALIZED NEEDS

MEMBER

40 West 40th Street • New York 18, N. Y.

chine. This works O.K., even on a one-hole spring wire job.

★ ★ ★

WIRE drawn from borax-coated stock can also be patented with no difficulty on an electric resistance furnace, and galvanizes better than wire drawn from lime-coated stock. In fact we once had a customer who galvanized his own fine rope wire and specified liquor finished wire as the only kind he could galvanize. An investigation showed that his cleaning and flux tank were one and the same thing set right next to the zinc pan. In front of this tank was a board with rows of nails. The wire was strung around nails to make enough **back pull** (where have I heard that expression before?) so that the wire would climb the 8" blocks of the pull out. We tried some wire drawn from borax-coated stock and it galvanized so well that we made the rest of the order that way.

★ ★ ★

SINCE we could never get borax-coated wire to draw on our small wet machines, we still lime coat all wire which is to be drawn on these machines.

★ ★ ★

Wire Finished and Trade Requirements

(*Continued from page 658*)

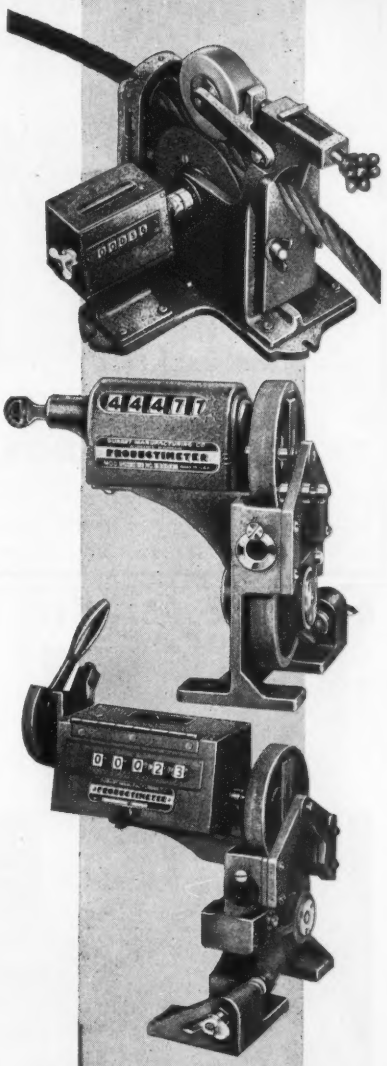
tained the highest physical properties as far as the drawing operations were concerned. All Dies were properly identified so that there was no danger of becoming mixed on the machine.

★ ★ ★

THE Co-operation and Assistance offered by the Wire Mills has in part made it possible for the Manufacturer of Tools, Machines, Dies, Lubricants and other Chemical Compounds to render improved service to the Industry. It is under actual working operation in the Mills that the new methods can be tested and fully worked out. As this relationship continues we may all look forward towards many progressive changes in each successive year.

★ ★ ★

PRODUCTIMETER
WIRE MEASURING MACHINES
Fast . . Accurate . . Dependable . . Legible



Productimeters measure all types of wire from .010 to 3½ inches in diameter . . . at speeds up to 5,000 feet per minute. They eliminate "guess-work". . . insure profitable operation in your plant.

Send for Catalog No. 40

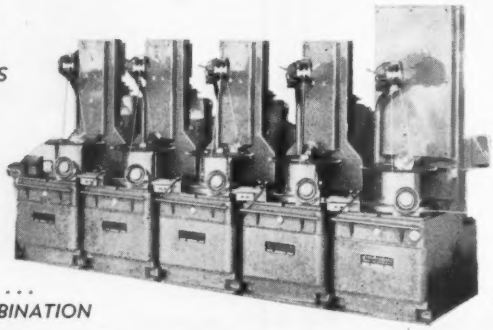
DURANT MFG. CO.
1918 N. Buffum St. Milwaukee 1, Wis.
118 Orange St. Providence 3, R. I.
Representatives in Principal Cities

PRODUCTIMETERS
SINCE 1879 *Speedometers* OF INDUSTRY

AETNA-STANDARD WIRE DRAWING UNIT

- DESIGNED FOR COMPLETE VERSATILITY
- BUILT FOR SAFE, EFFICIENT PRODUCTION
- SINGLE OR MULTI-DRAFT OPERATION
- INTERCHANGEABLE UNITS AND PARTS
- AUTO-RHEOSTATIC SYNCHRONIZATION
- WATER COOLED BLOCKS AND DIES

FERROUS OR NON-FERROUS



WET OR DRY LUBRICANTS

SINGLE UNIT ... OR ANY COMBINATION

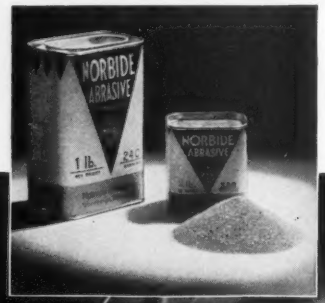
THE AETNA-STANDARD ENGINEERING CO.

YOUNGSTOWN, OHIO

ASSOCIATED COMPANIES: HEAD, WRIGHTSON & COMPANY, LTD., THORNABY-ON-TEES, ENGLAND

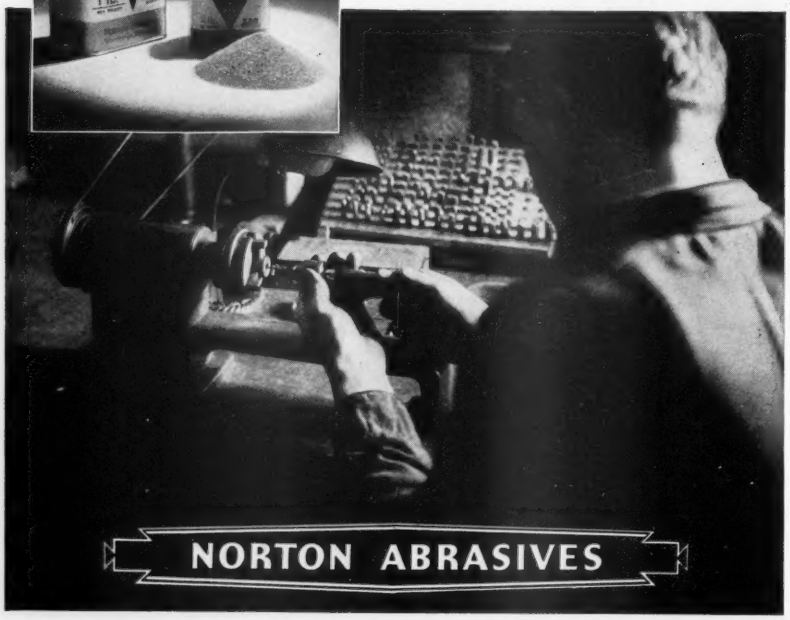
AETNA-STANDARD ENGINEERING COMPANY, LTD. . . . . TORONTO, ONTARIO, CANADA

NORBIDE Abrasive: Effective Economical



This abrasive—second only to the diamond in hardness and 150 times less expensive—does an efficient job of cutting and semi-finishing cemented carbide wire drawing dies.

NORTON CO. — Worcester 6, Mass.



NORTON ABRASIVES

Wire Association Pacific Coast Meeting

(*Continued from page 651*)

MR. BAESSLER has written Mr. Brown, Executive Secretary of the Wire Association, as follows: "In handling the job of program chairman for the first time, I felt like a man who couldn't swim, but who was thrown into the water to learn. Now that the Wire Association meeting in San Francisco is over, I am looking back and am measuring my strokes to see where I can improve the next time I take a swim.

★ ★ ★

"I AM writing this letter to ask you to thank publicly, through the medium of WIRE AND WIRE PRODUCTS, those men who assisted me in carrying out the committee work so necessary for the execution of a smooth-running program:

Frank Voss, Manager
Industrial Wire Products,
San Francisco, California

Andy Caridis, Mech. Engr.
Natural Gas Equipment Inc.,
San Francisco, California

Charlie Blesch, Manager
Natural Gas Equipment Inc.,
San Francisco, California

Earl Potter, Vice-President
Industrial Wire Products Corp.
Los Angeles, California

Ed Kinyon, Supt.
Wire & Wire Products, Div.,
Columbia Steel Company
Pittsburg, California

R. H. Steinbruk
E. H. Edwards Company
San Francisco, California

Wm. Mohr, Supt. Wire Mill,
The California Wire Cloth Corp.
So. San Francisco, California

J. Wm. DePoy, Chf. Engr.
The California Wire Cloth Corp.
Oakland, California

Russ Metzger, Asst. to Gen. Mgr. of Sales
The California Wire Cloth Corp.,
Oakland, California

★ ★ ★

"SPECIAL mention should be given to the speakers of the evening for their fine presentations and for having so unselfishly given their time in the preparation of their presentations.

Andy Riddle, Manager of Market Research
The Colorado Fuel & Iron Corporation
Denver, Colorado

Product of MODERN SCIENCE and MASTER CRAFTSMANSHIP

PHILIPS

Master-Made

DIAMOND DIES

● The tools of modern science are combined with the skills of the master craftsman in the production of PHILIPS *master-made* Diamond Dies.

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Columbia Steel Company
Pittsburg, California

C. R. Mehl, President,
Industrial Compounds Co.
Los Angeles, California

There were 80 at the plant visit and 109 at the dinner and technical session.

★ ★ ★

PACIFIC COAST REGIONAL MEETING ATTENDANCE, SAN FRANCISCO, CALIF., JUNE 16, 1950.

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South San Francisco, Calif.

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California Wire Cloth Corp.,
Oakland, Calif.

BARBATA, V. A., SALES REP.
Bethlehem Pacific Coast Steel Corp.,
20th & Illinois Sts.,
San Francisco, Calif.

BARRY, R. R.
Reynolds Wire Co., Dixon, Ill.

BEARD, READE M., GEN. SUPERVISOR, METALLURGY, ROD MILL & WIRE PROD.
Columbia Steel Co.,
Pittsburg, Calif.

BENGSTON, J. S., SUPV. OF INSPECTION WIRE MILL & ROLLING MILL,
Columbia Steel Co.,
Pittsburg, Calif.

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Natural Gas Equipment Inc.
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San Francisco, Calif.

BERGANDI, FRANK,
Bergandi Mfg. Co.,
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San Francisco, Calif.

BERRY, C. W., GEN. FOREMAN, WIRE ROPE MILL,
Columbia Steel Co., Pittsburg, Cal.

BEVINS, D. O., FOREMAN, DIE ROOM
Columbia Steel Co., Pittsburg, Cal.

BLESCH, CHAS. A.,
MGR. IND. FURN. DIV.,
Natural Gas Equipment Inc.,
1150 Folsom Street
San Francisco, Calif.

BRITTAIN, JOHN T.,
GEN. MGR. OF SALES,
California Wire Cloth Corp.,
1080 19th Ave., Oakland, Calif.

BROSWICK, PAUL,
DIE ROOM FOREMAN,
California Wire Cloth Corp.,
South San Francisco, Calif.

BROWN, RICHARD E., EXEC. SECY.,
The Wire Association,
300 Main St., Stamford, Conn.

BRUMBAUGH, C. C.
ASST., METALG. ENGR.,
Bethlehem Pacific Coast Steel Co.,
San Francisco, Calif.

BRUNS, ALBERT C., SALES REPR.,
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BUJIND, HARRY
Kaiser Steel Corp.,
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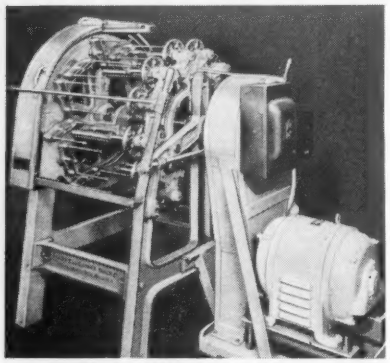

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DAVIS, K. H., PRESIDENT
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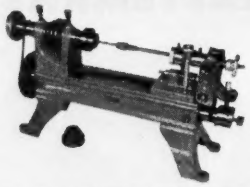

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Note these outstanding features for greater accuracy in polishing dies and for prolonged machine life!

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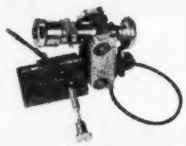

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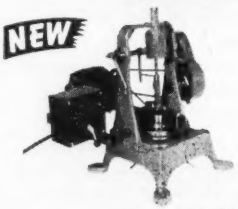

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Offers you three improved features: a die rotating attachment; a time switch; and a reversing switch—which provide these advantages:

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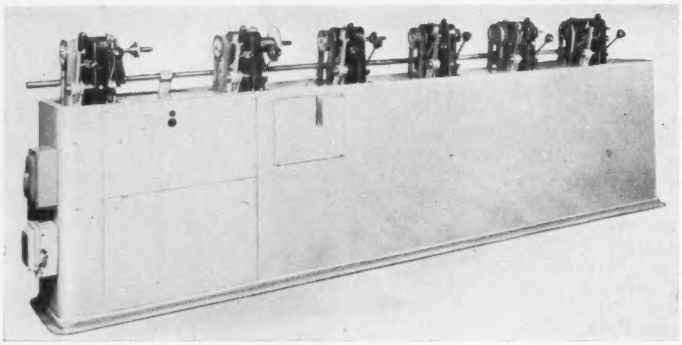

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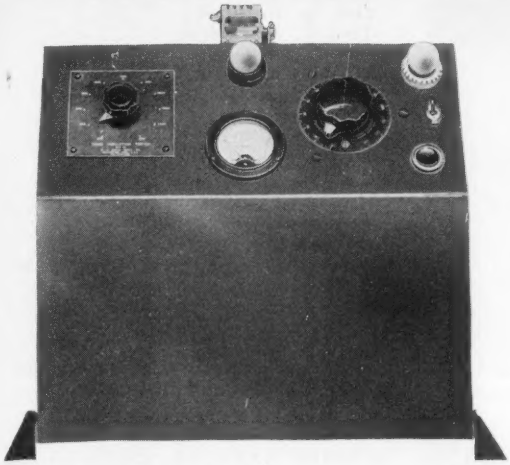

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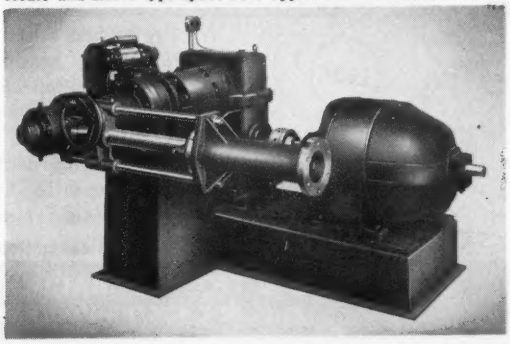

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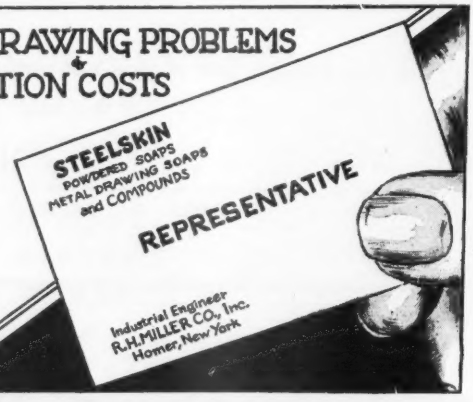

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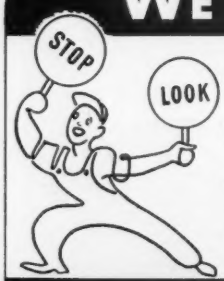

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★ ★ ★

Mechanical Scaling of Low Carbon Steel Rods

(*Continued from page 650*)

microscopically the profiles revealed by the edges of a middle cut of each wire. Fig. IV gives an illustration of the results obtained. Chemical pickling seems to fine the roughness of the surface whereas the mechanically scaled sample shows more spacious indentations, sufficient in practice to bring on a good coating of drawing soap. Moreover these differences are leveled out by successive drafts.

★ ★ ★

Physical Properties:

IN comparison with chemical pickling, mechanical scaling brings on a slight surface hardening, which raises the tensile strength and lowers the ductility of rods.

★ ★ ★

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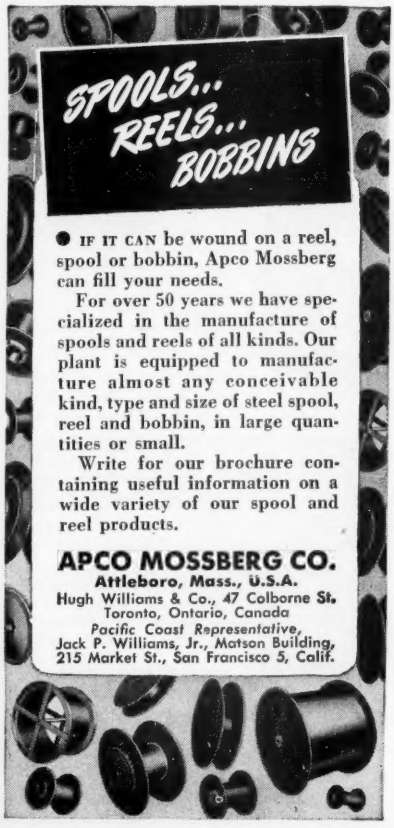
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HOWEVER this effect is attenuated by the first draft and disappears completely after the fourth draft. The table, Fig. V, gives clear examples of the results obtained.

★ ★ ★

BENDING tests and measuring of surface hardness under a small load lead to the same conclusion.

★ ★ ★

THE hardening brought about by normal cold-drawing quickly overcomes the differences of physical properties noticed before the first die.

★ ★ ★

Practical Results

THE mechanical scaling machine was substituted for the pickling process of low carbon 0.197 inch diameter rods in the case of dry wire drawing, which is the most usual, without requiring any outstanding modifications to working conditions, either in the wire-drawing plant or in the subsequent

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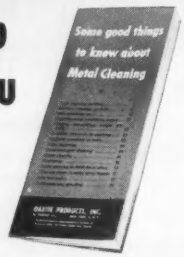

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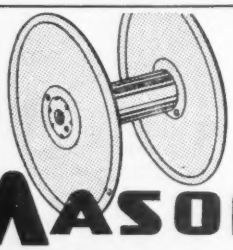

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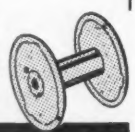

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workshops.

★ ★ ★

NO changes have therefore been made to the wire-drawing speeds either on the rod or intermediate wire drawing machines. In the same way the wire drawn after mechanical scaling lends itself perfectly to subsequent transformations, such as zinc-coating nail making, etc.

★ ★ ★

IT is only necessary for the inlet rods to be dry, as moisture disturbs the scaling process, which however is not affected by the superficial rust resulting from open air storage.

★ ★ ★

LIKEWISE, the usual lime coating not being applied, the drawing soaps have to be dry and powdery to adhere satisfactorily to the scaled rod strand.

★ ★ ★

BY using a drawing soap consumption slightly higher than usual, the life of dies remains nearly the same as with pickled rods.

★ ★ ★

Conclusion

IT may be asserted that mechanical scaling can now be used industrially in the case of low carbon steel rods as a substitute for chemical pickling and in such advantageous conditions that a rapid development of this process can be foreseen.

★ ★ ★

TAKING into account the waste brought about by the scale in either one or the other process, mechanical scaling can be said to amount to less than the half the cost of chemical pickling without giving any of the well-known disadvantages of the latter process.

★ ★ ★

IT is also possible to anticipate in the near future a big expansion of mechanical scaling in other departments of the wire industry.

★ ★ ★

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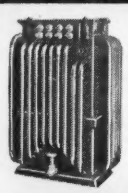

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Drag-Out Losses in Wire Plating

(*Continued from page 648*)

plating bath concentration, is given by

(13)

$$C_2 = \frac{\Theta^2 C_o}{(E/\Theta)^2 - E\Theta}$$

and in the third rinse tank

(14)

$$C_3 = \frac{\Theta^3 C_o}{(E/\Theta^3 - E\Theta(E/\Theta)}$$

and in the fourth rinse tank

(15)

$$C_4 = \frac{\Theta^4 C_o}{(E/\Theta)^4 - E\Theta(E/\Theta)^2}$$

and in the nth rinse tank

(16)

$$C_n = \frac{\Theta^n C_o}{(E/\Theta)^n - E\Theta(E/\Theta)^{n-2}}$$

★ ★ ★

IF, in the previous case where the drag-out loss was just equal to the evaporation loss, two such rinse tanks are used then

(17)

$$C_2 = \frac{\Theta^2 C_o}{(2\Theta)^2 - \Theta^2} = .33C_o$$

so that 67% of the loss is recovered. If three tanks were to be used in series then

(18)

$$C_3 = \frac{\Theta^3 C_o}{(2\Theta)^3 - \Theta^2(2\Theta)} = .167C_o$$

and 83.3% of the loss is recovered.

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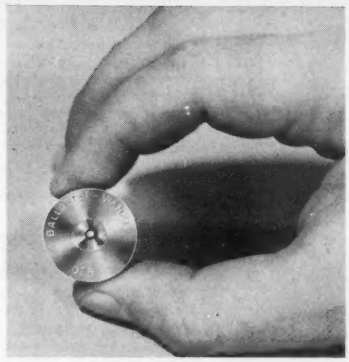

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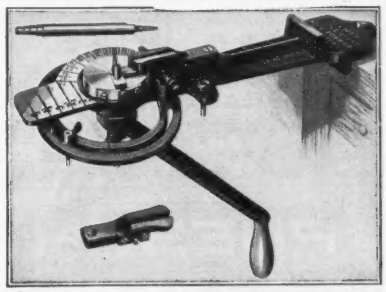

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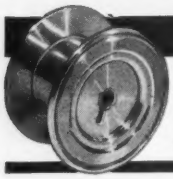

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THUS by increasing the number of recovery rinse tanks, any desired percentage of the loss can be recovered. It should be noticed that since this is an equilibrium process, the size of the rinse tanks used makes no difference in the amount of plating solution recovered. Accordingly, the rinse tanks for a system like this can be made as small as possible compatible with efficient handling of the wire.

★ ★ ★

TO determine the optimum number of rinse tanks to use on a line after the plating bath we can make use of the cost plot system previously described except that now we plot the cost per year per rinse tank added which will give approximately a straight line as before and the cost in terms of drag-out loss, as against the number of rinse tanks used. There will result as before a definite minimum and the number of tanks closest to this minimum value will be the optimum number of rinse tanks to use, in the line when designing or redesigning such a line.

★ ★ ★

IT is of interest to take an actual case and make the calculations to see how it works. In the gold plating line discussed previously, the evaporation rate is .005 gpm per sq. ft. of open tank surface and the total open surface is 10 sq. ft. In installing an equilibrium recovery system in the line, presuming adequate space is available, if it costs $40 a year per rinse tank in terms of space rental, amortized tank and equipment cost plus power to operate the feed back pump, how many tanks should be used for optimum results?

★ ★ ★

AS can be seen from the plot, the tank cost is a straight line running through the origin. Some computations are needed to obtain points on the recovery cost curve.

★ ★ ★

WITH one tank, the equilibrium concentration will be

(19)

$$\frac{.0048C_o}{.05 + .0048} = .0875\,C_o \quad (E = 10 \times .005)$$

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and the annual loss, assuming 300 working days in the year will be 480 x 300 x .0875 x 15 x .0048 = $906.00.

★ ★ ★

WITH two tanks, the equilibrium concentration will be (20)

$$\frac{(.0048)^2}{(.055)^2 - .05 \times .0048} = .0084C_0$$

and the annual loss will be 480 x 300 x .008 x 15 x.0048 = $87.00

★ ★ ★

WITH three tanks, $C_3 = .0007C_0$ and the annual loss will be $7.20. It can be seen at once without plotting the values that three recovery tanks in series is the optimum number of tanks for the line, since the annual additional saving produced by putting a fourth tank on the line will no longer pay for the fourth tank.

★ ★ ★

WHERE it is desired to keep harmful ions out of the sewage system the equilibrium recovery system in conjunction with rinsing systems proposed by the writer in a contemporary journal can be worked out to reduce to an absolute minimum the total amount and concentration of the harmful ions.

1. Water Control, Joseph B. Kushner, Metal Finishing, Vol. 47 P. 52 1949.

★ ★ ★

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by MAURICE BONZEL

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ABRASIVES—
Norton Co., Worcester, Mass.

ACID INHIBITORS—
(See Inhibitors, Pickling)

ACID-PROOF CONSTRUCTION—
Chemsteel Construction Co., Pittsburgh, Pa.
Haveg Corporation, Newark, Del.

ANNEALING MACHINES—Open Flame
Syncro Machine Co., Perth Amboy, N. J.

ANNEALING POTS AND BOXES—
Scudder, E. J., Foundry & Machine Co., Trenton, N. J.

ARMORING EQUIPMENT—
American Insulating Machy. Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc, Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.
Wire & Textile Machy., Inc., Pawtucket, R. I.

BAKERS—Rod and Wire
Carl-Mayer Corp., The, Cleveland, Ohio.
Drying Systems, Inc., Chicago, Ill.
Morgan Construction Co., Worcester, Mass.
Ross, J. O., Engr. Corp., New York, N. Y.

BAR STOCK—Stainless Steel
American Steel & Wire Company, Cleveland, Chicago, New York.
Columbia Steel Co., San Francisco, Calif.
U. S. Steel Export Company, New York, N. Y.

BOBBINS—Braider & Wire Weaving
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Company, Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Wire & Textile Machinery, Inc., Pawtucket, R.I.

BORAX—Wire Drawing
Pacific Coast Borax Corp., New York, N. Y.

BORON CARBIDE—
Norton Co., Worcester, Mass.

BRAKES—Pneumatic
Entwistle, Jas. L. Co., Pawtucket, R. I.

CABLE—Aluminum
Aluminum Co. of America, Pittsburgh, Pa.

CABLE LACQUERING OVENS—
Industrial Ovens, Inc., Cleveland, O.

CARRIERS—Braider, High Speed
Apco Mossberg Co., Attleboro, Mass.
Mossberg Pressed Steel Corp., Attleboro, Mass.
New England Butt Co., Providence, R. I.
Wire & Textile Machinery, Inc., Pawtucket, R.I.

CASTINGS—Wire Mill
Scudder, E. J., Fdry. & Mach. Co., Trenton, N.J.

CEMENTS—Refractory
Norton Co., Worcester, Mass.

CHEMICALS—Cleaning
(See Cleaners—Metal)

CLEANERS—Metal
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Phila., Pa.
Houghton, E. F., & Co., Philadelphia, Pa.
Magnus Chemical Co., Garwood, N. J.
Metal & Thermit Corp., New York, N. Y.
Oakite Products, Inc., New York, N. Y.
The Parkin Chemical Company, Pittsburgh, Pa.
Standard Industrial Compounds Co., Inc., Chicago, Ill.

CLEANING & PICKLING EQUIP.—
Chemsteel Construction Co., Pittsburgh, Pa.
Cleveland Tramrail Div., of the Cleveland Crane & Engineering Co., Wickliffe, O.
Haveg Corp., Newark, Del.
Holden, A. F., Company, The, New Haven, Conn. and Detroit, Mich.
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Wean Equipment Corp., Cleveland, Ohio.
Wilson Lee, Engr. Co., Cleveland, Ohio.

CLOTH—WIRE, All Metals
Roebling's, John A. Sons, Co., Trenton, N. J.
Wickwire Bros., Cortland, N. Y.

COATING COMPOUNDS—
Apex Alkali Products Co., Philadelphia, Pa.
Houghton, E. F. & Co., Philadelphia, Pa.
Magnus Chemical Co., Garwood, N. J.
Miller, R. H., Co., Inc., Homer, N. Y.
Oakite Products, Inc., New York, N. Y.
Standard Industrial Compounds Co., Inc., Chicago, Ill.

COILERS—Sheet, Strip and Wire
Entwistle, Jas. L. Co., Pawtucket, R. I.
Morgan Construction Co., Worcester, Mass.
Ruesch, H. J. Machine Co., Newark, N. J.
Torrington Mfg. Co., Torrington, Conn.
Wean Equipment Corp., Cleveland, Ohio.

COLD HEADERS—
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

COMPOUNDS—Coppering
American Chemical Paint Co., Ambler, Pa.

COMPOUNDS—Diamond
Eastern Carbide Corp., New Rochelle, N. Y.
Hyprez Division, Engis Equipment Co., Chicago, Ill.
Magnus Chemical Co., Garwood, N. J.

COMPOUNDS—For Improving Drawing and Extrusion
American Chemical Paint Co., Ambler, Pa.

COMPOUNDS—Metal Finishing
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.
Metal & Thermit Corp., New York, N. Y.

COMPOUNDS—Phosphate Coating
American Chemical Paint Co., Ambler, Pa.

COMPOUNDS—Rust Preventing
American Chemical Paint Co., Ambler, Pa.
American Lanolin Corp., Lawrence, Mass.
Apex Alkali Products Co., Philadelphia, Pa.
Houghton, E. F. & Co., Philadelphia, Pa.
Magnus Chemical Co., Garwood, N. J.
Oakite Products, Inc., New York, N. Y.

COMPOUNDS—Rust Removing
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.
Houghton, E. F. & Co., Philadelphia, Pa.
Oakite Products, Inc., New York, N. Y.
Standard Industrial Compounds Co., Inc., Chicago, Ill.

COMPOUNDS—Wire Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Bick, Hans C., Inc., Reading, Pa.
Houghton, E. F. & Co., Philadelphia, Pa.
Magnus Chemical Co., Garwood, N. J.
Miller, R. H. Co., Inc., Homer, N. Y.
Oakite Products, Inc., New York, N. Y.
Pacific Coast Borax Corp., New York, N. Y.
Potter, Neil C., Newark, N. J.
Standard Industrial Compounds Co., Inc., Chicago, Ill.
Swift & Company, Chicago, Ill.

CONDUCTORS—Flexible, Electrical
Montgomery Co., The, Windsor Locks, Conn.

COPHOLDERS—Steel
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Company, Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Wire & Textile Machinery, Inc., Pawtucket, R.I.

CORDS—Electrical, Tinsel Conductor
Montgomery Co., The, Windsor Locks, Conn.

CORROSION PREVENTIVES—
Angier Corporation, The, Framingham, Mass.

CRANES—Wire Mill
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

CUTTING TOOLS—Carbide
Carboloy Co., Inc., Detroit, Mich.
Eastern Carbide Corp., New Rochelle, N. Y.
Firth-Sterling Steel & Carbide Corp., McKeesport, Pa.
Metal Carbides Corporation, Youngstown, Ohio.
Rusch Wire Die Corp., Croton-on-the-Hudson, New York.
Vascoloy-Ramet Corp., North Chicago, Ill.

CUTTING TOOLS—Wire
Porter, H. K., Inc., Everett, Mass.

DIAMONDS—Industrial
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Diamond Distributors, Inc., New York, N. Y.
Rusch Wire Die Corp., Croton-on-the-Hudson, N. Y.
Wayne Wire Die Co., Hillside, N. J.

DIAMOND POWDERS—
Danforth, C. W., Co., Youngstown, Ohio.
Diamond Distributors, Inc., New York, N. Y.
Eastern Carbide Corp., New Rochelle, N. Y.
Hyprez Division, Engis Equipment Co., Chicago, Ill.
Indiana Wire Die Co., Ft. Wayne, Ind.
New England Wire Die Co., Worcester, Mass.
Rusch Wire Die Corp., Croton-on-the-Hudson, N. Y.
Wayne Wire Die Co., Hillside, N. J.

DIAMOND TOOLS—
Carboloy Co., Inc., Detroit, Mich.
Indiana Wire Die Co., Ft. Wayne, Ind.
Metal Carbides Corporation, Youngstown, Ohio.
Rusch Wire Die Corp., Croton-on-the-Hudson, N. Y.
Wayne Wire Die Co., Hillside, N. J.

DIES—Carbide
(See Dies—Tungsten Carbide)

DIES—Cold Heading
Carboloy Co., Inc., Detroit, Mich.
Eastern Carbide Corp., New Rochelle, N. Y.
Firth-Sterling Steel & Carbide Corp., McKeesport, Pa.
Indiana Wire Die Co., Ft. Wayne, Ind.
Metal Carbides Corporation, Youngstown, Ohio.
Vascoloy-Ramet Corp., No. Chicago, Ill.

DIES—Diamond
Ajax Industrial Supplies, Inc., Fort Wayne, Ind.
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Boulin, Victor J., New York, N. Y.
Cochaud Wire Die Corp., New York, N. Y.
Ft. Wayne Wire Die, Inc., Fort Wayne, Ind.
Indiana Wire Die Co., Ft. Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
New England Wire Die Co., Worcester, Mass.
North America,a Philips Co. Inc., New York, N. Y.
Rusch Wire Die Corp., Croton-on-the-Hudson, N. Y.
Wayne Wire Die Co., Hillside, N. J.

DIES—Extrusion
Carboloy Co., Inc., Detroit, Mich.
Eastern Carbide Corp. New Rochelle, N. Y.
Firth Sterling Steel & Carbide Corp., McKeesport, Pa.
Hartley Tool & Die Co., Thomaston, Conn.
Metal Carbides Corporation, Youngstown, Ohio.
Robertson, John, Co., Brooklyn, N. Y.
Rusch Wire Die Corp., Croton-on-the-Hudson, N. Y.
Wayne Wire Die Co., Hillside, N. J.

DIES—Eyelet
Eastern Carbide Corp. New Rochelle, N. Y.
Hartley Tool & Die Co., Thomaston, Conn.
Kelly Wire Die Corp., New York, N. Y.
Rusch Wire Die Corp., Croton-on-the-Hudson, N. Y.

DIES—Pointing
Sjogren Tool and Machine Co., Auburn, Mass.

DIES—Repairs & Re-Cutting
Ajax Industrial Supplies, Inc., Fort Wayne, Ind.
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Boulin, Victor J., New York, N. Y.
Carboloy Co., Detroit, Mich.
Cochaud Wire Die Corp., New York, N. Y.
Eastern Carbide Corp. New Rochelle, N. Y.
Firth-Sterling Steel & Carbide Corp., McKeesport, Pa.
Ft. Wayne Wire Die, Inc., Fort Wayne, Ind.
Hartley Tool & Die Co., Thomaston, Conn.
Indiana Wire Die Co., Ft. Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
Metal Carbides Corporation, Youngstown, Ohio.
New England Wire Die Co., Worcester, Mass.
North American Philips Co., Inc., New York, N. Y
Rusch Wire Die Corp., Croton-on-the-Hudson, N. Y.
Vascoloy-Ramet Corp., North Chicago, Ill.
Wayne Wire Die Co., Hillside, N. J.

DIES—Special Shapes, Etc.
Eastern Carbide Corp., New Rochelle, N. Y.
Firth-Sterling Steel & Carbide Corp., McKeesport, Pa.
Hartley Tool & Die Co., Thomaston, Conn.
Indiana Wire Die Co., Ft. Wayne, Ind.
Rusch Wire Die Corp., Croton-on-the-Hudson, N. Y.

DIES—Swaging
Sjogren Tool & Machine Co., Inc., Auburn, Mass.

DIES—Tantalum Carbide
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Carboloy Co., Inc., Detroit, Mich.
Eastern Carbide Corp. New Rochelle, N. Y.
Firth-Sterling Steel & Carbide Corp., McKeesport, Pa.
Kelly Wire Die Corp., New York, N. Y.
Metal Carbides Corporation, Youngstown, Ohio.

WHERE TO BUY, Continued

Rusch Wire Die Corp., Croton-on-the-Hudson, N. Y.
Vascoloy-Ramet Corp., North Chicago, Ill.

DIES—Tube Drawing
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Carboloy Co., Inc., Detroit, Mich.
Eastern Carbide Corp., New Rochelle, N. Y.
Firth-Sterling Steel & Carbide Corp., McKeesport, Pa.
Hartley Tool & Die Co., Thomaston, Conn.
Indiana Wire Die Co., Fort Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
Metal Carbides Corp., Youngstown, O.
Rusch Wire Die Corp., Croton-on-the-Hudson, N. Y.
Vascoloy-Ramet Corp., North Chicago, Ill.

DIES—Tungsten Carbide
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Carboloy Co., Inc., Detroit, Mich.
Eastern Carbide Corp., New Rochelle, N. Y.
Firth-Sterling Steel & Carbide Corp., McKeesport, Pa.
Hartley Tool & Die. Co., Thomaston, Conn.
Kelly Wire Die Corp., New York, N. Y.
Metal Carbides Corp., Youngstown, O.
Rusch Wire Die Corp., Croton-on-the-Hudson, N. Y.
Vascoloy-Ramet Corp., North Chicago, Ill.
Wayne Wire Die Co., Hillside, N. J.

DRAW BENCHES—
(See MACHINERY—Draw Benches)

DRUMS—Flange Steel
Hubbard Spool Company, Chicago, Ill.

DRUMS—Vulcanizing
Mossberg Pressed Steel Corp., Attleboro, Mass.
Watson Machine Co., The, Paterson, N. J.

DRYING EQUIPMENT—
Carl-Mayer Corp., The, Cleveland, Ohio.
Drying Systems, Inc., Chicago, Ill.
Industrial Ovens, Inc., Cleveland, Ohio.
National Rubber Machinery Co., Akron, Ohio.
Rockwell, W. S., Co., Fairfield, Conn.
Ross, J. O., Engineering Corp., New York, N. Y.

ENGINEERS—Consulting
Galvanizing—Imhoff, Wallace G. Co., The, Los Angeles, Calif.
Metal Fatigue—Fatigue of Materials Laboratory, Princeton, N. J.
Wire Mill—Lewis, Kenneth B., Worcester, Mass.

EQUIPMENT—Insulation Testing
Davis, R. L., Elec. Co., Wallingford, Conn.
Entwistle, James L., Co., Pawtucket, R. I.

EYELETS—Brass or Zinc
Platt Bros. & Co., The, Waterbury, Conn.

FENCING & FENCES—Wire
Interlocking Fence Co., Morton, Ill.

FLUXES—Soldering
American Chemical Paint Co., Ambler, Pa.

FOAM PRODUCING COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.
Parkin Chemical Company, The, Pittsburgh, Pa.

FRICTION PAY-OFF STANDS—
Industrial Ovens, Inc., Cleveland, Ohio.

FURNACES—Annealing
Ajax Electric Co., Inc., Philadelphia, Pa.
Carl-Mayer Corp., The, Cleveland, Ohio.
Drying Systems, Inc., Chicago, Ill.
Electric Furnace Co., Salem, Ohio.
Holden, A. F., Co., The, New Haven, Conn. and Detroit, Mich.
Rockwell, W. S., Co., Fairfield, Conn.
Surface Combustion Corp., Toledo, Ohio.
Trauwood Engr. Co., Cleveland, Ohio.
Wilson, Lee, Engr. Co., Cleveland, Ohio.

FURNACES—Automatic
Electric Furnace Co., Salem, Ohio.
Surface Combustion Corp., Toledo, Ohio.
Wilson, Lee, Engr. Co., Cleveland, Ohio.

FURNACES—Brazing
Electric Furnace Co., Salem, Ohio.
Rockwell, W. S., Co., Fairfield, Conn.

FURNACES—Bright Annealing
Electric Furnace Co., Salem, Ohio.
Michigan Oven Co., Detroit, Mich.
Rockwell, W. S., Co., Fairfield, Conn.
Surface Combustion Corp., Toledo, Ohio.
Wilson, Lee, Engr. Co., Cleveland, Ohio.

FURNACES—Electric
Electric Furnace Co., Salem, Ohio.
Rockwell, W. S., Co., Fairfield, Conn.
Trauwood Engineering Co., The, Cleveland, Ohio.

FURNACES—Galvanizing Equipment
Ajax Electric Co., Inc., Philadelphia, Pa.
Electric Furnace Co., Salem, Ohio.
Holden, A. F., Co., The, New Haven, Conn, and Detroit, Mich.
Rockwell, W. S. Co., Fairfield, Conn.
Surface Combustion Corp., Toledo, Ohio.
Trauwood Engineering Co., The, Cleveland, Ohio.
Wilson, Lee, Engr. Co., Cleveland, Ohio.

FURNACES—Hard'ing & Temp'ing
Ajax Electric Co., Inc., Philadelphia, Pa.
Drying Systems, Inc., Chicago, Ill.
Electric Furnace Co., Salem, Ohio.
Holden, A. F., Co., The, New Haven, Conn, and Detroit, Mich.
Rockwell, W. S., Co., Fairfield, Conn.
Surface Combustion Corp., Toledo, Ohio.
Trauwood Engineering Co., The, Cleveland, Ohio

FURNACES—Lead Melting
Electric Furnace Co., Salem, Ohio.
Robertson, John, Co., Brooklyn, N. Y.
Rockwell, W. S., Co., Fairfield, Conn.
Surface Combustion Corp., Toledo, Ohio.

FURNACES—Non-Oxidizing
Ajax Electric Co., Inc., Philadelphia, Pa.
Electric Furnace Co., Salem, Ohio.
Holden, A. F., Co., The, New Haven, Conn, and Detroit, Mich.
Surface Combustion Corp., Toledo, Ohio.

FURNACES—Normalizing
Ajax Electric Co., Inc., Philadelphia, Pa.
Carl-Mayer Corp., The, Cleveland, Ohio.
Drying Systems, Inc., Chicago, Ill.
Electric Furnace Co., Salem, Ohio.
Holden, A. F., Co., The, New Haven, Conn, and Detroit, Mich.
Rockwell, W. S., Co., Fairfield, Conn.
Surface Combustion Corp., Toledo, Ohio.

FURNACES—Pot (oil, gas, electric)
Ajax Electric Co., Inc., Philadelphia, Pa.
Holden, A. F., Co., The, New Haven, Conn, and Detroit, Mich.

FURNACES—Resistance Heating, Strand
Trauwood Engineering Co., The, Cleveland, Ohio.

FURNACES—Salt Bath
Ajax Electric Co., Inc., Philadelphia, Pa.
Electric Furnace Co., Salem, Ohio.
Holden, A. F., Co., The, New Haven, Conn, and Detroit, Mich.
Rockwell, W. S., Co., Fairfield, Conn.
Surface Combustion Corp., Toledo, Ohio.

FURNACES—Wire, Strip & Sheet
Carl-Mayer Corp., The, Cleveland, Ohio.
Eisler Engineering Co., Newark, N. J.
Electric Furnace Co., Salem, Ohio.
Michigan Oven Co., Detroit, Mich.
Rockwell, W. S., Co., Fairfield, Conn.
Surface Combustion Corp., Toledo, Ohio.
Trauwood Engineering Co., The, Cleveland, Ohio.
Wilson, Lee, Engr. Co., Cleveland, Ohio.

GALVANIZING EQUIPMENT—
Steel Equipment Co., Cleveland, Ohio.
Wean Equipment Corp., Cleveland, Ohio.

GRINDERS—Roll
Norton Co., The, Worcester, Mass.

HAMMERS—Swaging
Sjogren Tool and Machine Co., Auburn, Mass.

HOOKS—Pickling & Liming
Lewis Welding & Eng'g Corp., Bedford, Ohio.
Youngstown Welding & Engineering Co., Youngstown, Ohio.

HOISTS—Electric Travelling
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., Wickliffe, Ohio.

INHIBITORS—Pickling
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.
Houghton, E. F. & Co., Philadelphia, Pa.
Oakite Products, Inc., New York, N. Y.
Parkin Chemical Company, The, Pittsburgh, Pa.

INSULATING LACQUERING SYSTEMS—Continuous
American Insulating Machine Co., Phila., Pa.
Industrial Ovens, Inc., Cleveland, Ohio.

INSULATING MATERIALS—
Belding, Heminway, Corticelli Co., New York, N. Y.
Glass Fibers, Inc., Waterville, Ohio.
Merrimac Paper Co., New York, N. Y.
New England Lacquer Co., E. Providence, R. I.
Owens Corning Fiberglas Corp., Toledo, O.
Standard Varnish Works, Staten Island, N. Y.
Twitchell, E. W., Philadelphia, Pa.

INSULATING MATERIALS—Paper — For Electric Wire Cable.
Merrimac Paper Co., New York, N. Y.
Twitchell, E. W., Philadelphia, Pa.

LACQUERS—For Electric Wire
New England Lacquer Co., E. Providence, R. I.
Standard Varnish Works, Staten Island, N. Y.

LAME—LAHN—
Montgomery Co., The, Windsor Locks, Conn.

LATHES—Die Reaming
Carboloy Co., Inc., Detroit, Mich.
Roos, Tool & Mfg. Co., Montclair, N. J.

LIME—
Warner Co., Philadelphia and Bellefonte, Pa.

LININGS—Acid and Alkali Proof
Haveg Corp., Newark, Del.

LUBRICANTS — For Metal Cutting, Stamping and Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Houghton, E. F. & Co., Philadelphia, Pa.
Magnus Chemical Co., Garwood, N. J.
Miller, R. H., Co., Inc., Homer, N. Y.
Oakite Products, Inc., New York, N. Y.
Standard Industrial Compounds Co., Inc., Chicago, Ill.

LUBRICANTS—Wire Drawing
(See Compounds—Wire Drawing)

LUBRICANTS—Wire Rope
Swift & Co., Chicago, Ill.

LUMBER—Wire Mill, for lagging and car blocking
North Anson Reel Co., North Anson, Maine.

MACHINERY—Armoring (Cable, Wire Hose)
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Barbed Wire
Glader Machine Works, Chicago, Ill.
Wean Engineering Co., Cleveland, Ohio.

MACHINERY—Bead Wrapping
Terkelsen Machine Co., Boston, Mass.

MACHINERY—Braiding
Mossberg Pressed Steel Corp., Attleboro, Mass.
New England Butt Co., Providence, R. I.
Wardwell Braiding Machine Co., Central Falls, R. I.
Wire & Textile Mach'y, Inc., Pawtucket, R. I.

MACHINERY—Brazing
Eisler Engineering Co., Newark, N. J.
Syncro Machine Co., Perth Amboy, N. J.

MACHINERY—Bunching
American Insulating Mach'y Co., Phila., Pa.
Haskell-Dawes Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.
Wire & Textile Machinery, Inc., Pawtucket, R.I.

MACHINERY—Bundling, Scrap
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Cable, Electric
American Insulating Mach'y Co., Phila., Pa.
Haskell-Dawes Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Chain Making
Nilson, A. H. Machine Co., The, Bridgeport, Conn.

WHERE TO BUY, Continued

MACHINERY—Cable, Rope Closing
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Coilers
Boyd & Sons Manufacturing Co., Phila., Pa.
Eisler Engineering Co., Newark, N. J.
Entwistle, Jas. L. Co., Pawtucket, R. I.
Morgan Construction Co., Worcester, Mass.
National Machinery Exchange (uscd), New York, N. Y.
New England Butt Co., Providence, R. I.
Ruesch, H. J. Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.
Watson Machine Co., Paterson, N. J.
Wean Equipment Corp., Cleveland, Ohio.
Wire & Textile Machinery, Inc., Pawtucket, R. I.

MACHINERY—Cold Heading
(See Cold Headers)

MACHINERY—Copper Wire Drawing and Rolling
Aetna-Standard Engineering Co., Youngstown, Ohio.
American Insulating Mach'y Co., Phila., Pa.
National Mach'y Exch. (Uscd), New York, N. Y.
Ruesch, H. J. Machine Co., Newark, N. J.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Covering Wire
American Insulating Mach'y Co., Phila., Pa.
National Rubber Machinery Co., Akron, Ohio.
New England Butt Co., Providence, R. I.
Royle, John & Sons, Paterson, N. J.
Standard Machinery Co., Mystic, Conn.
Syncro Machine Co., Perth Amboy, N. J.
Wardwell Braiding Machine Co., Central Falls, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Cutting
Eisler Engineering Co., Newark, N. J.
Lewis Machine Co., The, Cleveland, Ohio.
Mettler Machine Tool, Inc., New Haven, Conn.
National Mach'y Exch. (Used) New York, N. Y.
Nilson Machine Co., A. H., Bridgeport, Conn.
Porter, H. K., Inc., Everett, Mass.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Wean Equipment Corp., Cleveland, Ohio.

MACHINERY—Die Making
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel & Carbide Corp., McKeesport, Pa.
Kelly Wire Die Corp., New York, N. Y.
Red Star Engineering, Inc., Rahway, N. J.
Roos, Tool & Mfg. Co., Montclair, N. J.
Wayne Wire Die Co., Hillside, N. J.

MACHINERY—Draw Benches
Aetna-Standard Engineering Co., Youngstown, Ohio.
Morgan Construction Co., Worcester, Mass.
Ruesch, H. J., Machine Co., Newark, N. J.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Wean Equipment Corp., Cleveland, Ohio.

MACHINERY—Edging
Wean Equipment Corp., Cleveland, Ohio.

MACHINERY—Enameling
American Insulating Mach'y Co., Phila., Pa.
Industrial Ovens, Inc., Cleveland, Ohio.
Michigan Oven Co., Detroit, Mich.
Syncro Machine Co., Perth Amboy, N. J.

MACHINERY—Extruding
National Rubber Machinery Co., Akron, Ohio.
Robertson, John, Co., Brooklyn, N. Y.
Royle, John, & Sons, Paterson, N. J.
Standard Machinery Co., Mystic, Conn.
Wire & Textile Machinery, Inc., Pawtucket, R.I.

MACHINERY—Fence
Glader, Wm., Machine Works, Chicago, Ill.
Interlocking Fence Co,, Morton, Ill.
Wean Equipment Corp., Cleveland, Ohio.

MACHINERY—Filament Coil Winding
Eisler Engineering Co., Newark, N. J.

MACHINERY—Flat Wire
Ruesch, H. J., Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Wean Equipment Corp., Cleveland, Ohio.

MACHINERY—Galvanizing
(See Galvanizing Equipment)

MACHINERY—Galvanizing Wire
Sleeper & Hartley, Inc., Worcester, Mass.
Steel Equipment Co., Cleveland, Ohio.
Vaughn Machinery Co., Cuyahoga Falls, O.
Wean Equipment Corp., Cleveland, Ohio.
Wilson, Lee, Engr. Co., Cleveland, Ohio.

MACHINERY—Gang Winders
Entwistle, Jas. L. Co., Pawtucket, R. I.
Ruesch, H. J., Machine Co., Newark, N. J.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Grinding
Norton Co., The, Worcester, Mass.

MACHINERY—Insulating
American Insulating Mach'y Co., Phila., Pa.
National Rubber Machinery Co., Akron, Ohio.
New England Butt Co., Providence, R. I.
Royle, John & Sons, Paterson, N. J.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Lead Encasing Presses, etc.
Robertson, John Co., Brooklyn, N. Y.

MACHINERY—Lead Stripping
Robertson, John Co., Brooklyn, N. Y.

MACHINERY—Lock Washer
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Looms, Wire Weaving
Interlocking Fence Co., Morton, Ill.

MACHINERY—Magnet Wire
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.

MACHINERY—Material Handling
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., Wickliffe, O.

MACHINERY—Measuring Wire & Cable
Durant Mfg. Co., Milwaukee, Wis.
Entwistle, Jas. L. Co., Pawtucket, R. I.
New England Butt Co., Providence, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Nail and Tack
Glader, Wm., Machine Works, Chicago, Ill.
National Mach'y Exch. (Used), New York, N.Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Wean Equipment Corp., Cleveland, Ohio.

MACHINERY—Panning
American Insulating Mach'y Co., Phila., Pa.
Syncro Machine Co., Perth Amboy, N. J.
Wire & Textile Machinery, Inc., Pawtucket, R.I.

MACHINERY—Pickling
Chemsteel Construction Co., Pittsburgh, Pa.
Youngstown Welding & Engineering Co., Youngstown, Ohio.

MACHINERY—Pointing
Aetna-Standard Engineering Co., Youngstown, Ohio.
Morgan Construction Co., Worcester, Mass.
National Mach'y Exch. (Used), New York, N.Y.
Ruesch, H. J., Machine Co., Newark, N. J.
Scudder, E. J., Fdry & Mach. Co., Trenton, N.J.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.
Wean Equipment Corp., Cleveland, Ohio.

MACHINERY—Poultry Wire Fencing
Interlocking Fence Co., Morton, Ill.

MACHINERY—Rod Mill
Morgan Construction Co., Worcester, Mass.
Ruesch, H. J., Machine Co., Newark, N. J.
Wean Equipment Corp., Cleveland, Ohio.

MACHINERY—Rolling Mill
Morgan Construction Co., Worcester, Mass.
National Mach'y Exch. (Used), New York, N.Y.
Ruesch, H. J., Machine Co., Newark, N. J.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.
Wean Equipment Corp., Cleveland, Ohio.

MACHINERY—Rubber Insulating
National Rubber Machinery Co., Akron, Ohio.
Royle, John & Sons, Paterson, N. J.
Standard Machinery Co., Mystic, Conn.
Wire & Textile Machinery, Inc., Pawtucket, R.I.

MACHINERY—Rubber Tubing and Straining
National Rubber Machinery Co., Akron, Ohio.
New England Butt Co., Providence, R. I.
Royle, John & Sons, Paterson, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Mystic, Conn.
Wire & Textile Machinery, Inc., Pawtucket, R.I.

MACHINERY—Screw Wire
National Mach'y Exch. (Used), New York, N.Y.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Special
American Insulating Mach'y Co., Phila., Pa.
Davis, R. L. Electric Co., Wallingford, Conn.
Emory, Robert J., Co., Newark, N. J.
Entwistle, Jas. L. Co., Pawtucket, R. I.
New England Butt Co., Providence, R. I.
Red Star Engineering, Inc., Rahway, N. J.
Ruesch, H. J. Machine Co., Newark, N. J.
Scudder, E. J., Fdry & Mach. Co., Trenton, N.J.
Sjogren Tool and Machine Co., Auburn, Mass.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Mystic, Conn.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.
Wean Equipment Corp., Cleveland, Ohio.

MACHINERY—Spooling
American Insulating Mach'y Co., Phila., Pa.
Boyd & Sons Manufacturing Co., Phila., Pa
Davis, R. L. Electric Co., Wallingford, Conn.
Eisler Engineering Co., Newark, N. J.
Emory, Robert J., Co., Newark, N. J.
Entwistle, Jas. L. Co., Pawtucket, R. I.
National Mach'y Exch. (Used), New York, N.Y.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Steel Equipment Co., Cleveland, Ohio.
Syncro Machine Co., Perth Amboy, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Watson Machine Co., Paterson, N. J.
Wean Equipment Corp., Cleveland, Ohio.
Wire & Textile Mach'y, Inc., Pawtucket, R. I.

MACHINERY—Spring Making
National Mach'y Exch. (Used), New York, N.Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Wells, Frank L., Co., Kenosha, Wisc.

MACHINERY—Staple
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Straightening
Lewis Machine Co., The, Cleveland, Ohio.
Mettler Machine Tool Co., New Haven, Conn.
National Mach'y Exch. (Used), New York, N.Y.
Nilson, A. H. Machine Co., Bridgeport, Conn.
Ruesch, H. J., Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Wean Equipment Corp., Cleveland, Ohio.
Wells, Frank L., Co., Kenosha, Wisc.

MACHINERY—Stranding
Haskell-Dawes Machine Co., Philadelphia, Pa.
Hughesville Machine & Tool Co., Hughesville, Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Strip Steel
Aetna-Standard Engineering Co., Youngstown, Ohio.
Ruesch, H. J., Machine Co., Newark, N. J.
Steel Equipment Co., Cleveland, Ohio.
Wean Equipment Corp., Cleveland, Ohio.

MACHINERY—Swaging
National Mach'y Exch. (Used), New York, N.Y.
Ruesch, H. J., Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Taping
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.
Wire & Textile Machinery, Inc., Pawtucket, R.I.

WHERE TO BUY, Continued

MACHINERY—Testing Physical
Scott Testers, Inc., Providence, R. I.

MACHINERY—Testing Equipment—Sparkers
Davis, R. L. Elec, Co., Wallingford, Conn.
Entwistle, Jas. L., Pawtucket, R. I.
Wire & Textile Machinery, Inc., Pawtucket, R.I.

MACHINERY—Tinning Wire
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Steel Equipment Co., Cleveland, Ohio.
Syncro Machine Co., Perth Amboy, N. J.
Wean Equipment Co., Cleveland, Ohio.

MACHINERY—Tinsel Rolling Mills
American Insulating Mach'y Co., Phila., Pa.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Trolley Wire
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Tube Mill
Marshall-Richards Machine Company, Ltd., Trenton, N. J.

MACHINERY—Twinning
(See Mach.—Bunching)

MACHINERY—Welding Wire
Eisler Engineering Co., Newark, N. J.
Micro Products Co., Chicago, Ill.
Syncro Machine Co., Perth Amboy, N. J.

MACHINERY—Winding
American Insulating Mach'y Co., Phila., Pa.
Davis, R. L. Electric Co., Wallingford, Conn.
Eisler Engineering Co., Newark, N. J.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wind-up (Constant Tension, Variable Speed)
Aetna-Standard Engineering Co., Youngstown, Ohio.
Davis, R. L. Electric Co., Wallingford, Conn.
Industrial Ovens, Inc., Cleveland, Ohio.
Marshall-Richards Machine Company, Ltd., Trenton, N. J.
National Rubber Mach'y Co., Akron, Ohio.
Standard Machinery Co., Mystic, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wire Bending
Eisler Engineering Co., Newark, N. J.
Kilmer, M. D., & Co., Cleveland, Ohio.

MACHINERY—Wire Drawing
Aetna-Standard Engineering Co., Youngstown, Ohio.
American Insulating Mach'y Co., Phila., Pa.
Marshall-Richards Machine Company, Ltd., Trenton, N. J.
Morgan Construction Co., Worcester, Mass.
National Mach'y Exch. (Used), New York, N.Y.
Ruesch, H. J., Machine Co., Newark, N. J.
Scudder, E. J., Fdry & Mach. Co., Trenton, N.J.
Sleeper & Hartley, Inc., Worcester, Mass.
Steel Equipment Co., Cleveland, Ohio.
Svenska Telegrambyran (Morgardshammer) Stockholm, Sweden
Syncro Machine Co., Perth Amboy, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.
Wean Equipment Corp., Cleveland, Ohio.

MACHINERY—Wire Forming
Kilmer, M. D. & Co., Cleveland, Ohio.
National Mach'y Exch. (Used), New York, N.Y.
Nilson Machine Co., A. H., Bridgeport, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Wire Rope
New England Butt Co., Providence, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wood Screw
National Mach'y Exch. (Used), New York, N.Y.

MACHINERY—Wrapping Straight Lengths and Tubing
Angier Corporation, The, Framingham, Mass.
Terkelsen Machine Co., Boston, Mass.

MACHINERY—Wrapping Wire Coils
Angier Corporation, The, Framingham, Mass.
Terkelsen Machine Co., Boston, Mass.

MATERIAL HANDLING EQUIPMENT
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., Wickliffe, O.

MILLS—Tandem, Rolling & Edging
Torrington Mfg. Co., Torrington, Conn.
Wean Equipment Co., Cleveland, Ohio.

NAILS—Wire
American Steel & Wire Co., Cleveland, Chicago, New York.
Bethlehem Steel Co., Bethlehem, Pa.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Keystone Steel & Wire Co., Peoria, Ill.
Roebling, John A. Sons Co., Trenton, N. J.
U. S. Steel Export Co., New York, N. Y.
Wickwire Brothers, Inc., Cortland, N. Y.

OVENS—Cable Lacquering
American Insulating Mach'y Co., Phila., Pa.
Carl-Mayer Corp., The, Cleveland, Ohio.
Industrial Ovens, Inc., Cleveland, Ohio.
Michigan Oven Co., Detroit, Mich.

OVENS—Dehydrogenizing
Industrial Ovens, Inc., Cleveland, Ohio.

OVENS—Industrial
Drying Systems, Inc., Chicago, Ill.
Industrial Ovens, Inc., Cleveland, Ohio.
Michigan Oven Co., Detroit, Mich.
Ross, J. O., Engr. Corp., New York, N. Y.

OVENS—Rod Bakers
Carl-Mayer Corp., The, Cleveland, Ohio.
Drying Systems, Inc., Chicago, Ill.
Michigan Oven Co., Detroit, Mich.
Rockwell, W. S. Co., Fairfield, Conn.
Ross, J. O. Eng'g Corp., N. Y., N. Y.

OVENS—Welding Rod Coating
Carl-Mayer Corp., The, Cleveland, Ohio.
Drying Systems, Inc., Chicago, Ill.
Industrial Ovens, Inc., Cleveland, Ohio.
Ross, J. O., Engr. Corp., New York, N. Y.

PAINT BONDING CHEMICALS—
American Chemical Paint Co., Ambler, Pa.

PAINTS—Heat Resisting
American Chemical Paint Co., Ambler, Pa.

PANS—Vulcanizing
Mossberg Pressed Steel Corp., Attleboro, Mass.

PAPER—Creped Wrapping
Angier Corporation, The, Framingham, Mass.
Crepe-Kraft Company, The, Division National Waterproof Papers, Inc., Newark, N. J.
Terkelsen Machine Co., Boston, Mass.

PAPER—For Coil Wrapping and Corrosion Prevention
Angier Corporation, The, Framingham, Mass.
Crepe-Kraft Company, The, Division National Waterproof Papers, Inc., Newark, N. J.
Terkelsen Machine Co., Boston, Mass.

PATENT ATTORNEYS—
Lancaster, Allwine & Rommel, Washington, D.C.

PHOSPHATE COATING CHEMICALS
American Chemical Paint Co., Ambler, Pa.
Oakite Products, Inc., New York, N. Y.

PICKLING COMPOUNDS—
See (Inhibitors—Pickling)

PICKLING—Hooks, etc. Acid Resisting
Lewis Welding & Eng'g Corp., Bedford, Ohio.
Youngstown Welding & Engineering Co., Youngstown, Ohio.

PICKLING TANK LININGS—
Chemsteel Construction Co., Pittsburgh, Pa.
Haveg Corp., Newark, Del.

PLASTIC TESTERS—
Scott Testers, Inc., Providence, R. I.

PNEUMATIC CYLINDERS—
Entwistle, James L. Co., Pawtucket, R. I.

POTS—Lacquer
Industrial Ovens, Inc., Cleveland, Ohio.

POTS—Lead Melting
Robertson, John, Co., Brooklyn, N. Y.

PRESSES—Hydraulic and Mechanical
Robertson, John, Co., Brooklyn, N. Y.
Standard Machinery Co., Mystic, Conn.

PRESSES—Lead
Robertson, John, Co., Brooklyn, N. Y.

PULLERS AND GRIPS—For Wire
Morgan Construction Co., Worcester, Mass.
Scudder, E. J. Fdry & Mach. Co., Trenton, N.J.
Sjogren Tool and Machine Co., Auburn, Mass.
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Wean Equipment Corp., Cleveland, Ohio.

PUMPS—Hydraulic
Robertson, John, Co., Brooklyn, N. Y.

REEL AND TENSION STANDS—
Davis, R. L. Electric Co., Wallingford, Conn.
Entwistle, James L., Co., Pawtucket, R. I.
Industrial Ovens, Inc., Cleveland, Ohio.
Roll-a-Reel, Cincinnati, Ohio.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

REEL CRUTCHES—
Roll-a-Reel, Cincinnati, Ohio
Watson Machine Co., Paterson, N. J.

REELS & SPOOLS—Drawn Aluminum Alloy
Acrometal Products, Inc., Minneapolis, Minn.
Hubbard Spool Co., Chicago, Ill.

REELS & SPOOLS—Annealing and Stranding
Acrometal Products, Inc., Minneapolis, Minn.
American Pulley Company, Philadelphia, Pa.
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Niles Steel Products Div., Republic Steel Corp. Niles, Ohio.

REELS & SPOOLS—Collapsible
Entwistle, Jas. L. Co., Pawtucket, R. I.

REELS & SPOOLS—Plastic
Hubbard Spool Co., Chicago, Ill.

REELS & SPOOLS—Steel
American Pulley Company, Philadelphia, Pa.
Apco Mossberg Co., Attleboro, Mass.
Clark, J. L., Mfg. Co., Rockford, Ill.
Hubbard Spool Co., Chicago, Ill.
Mason Can Company, Providence, R. I.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Niles Steel Products Div., Republic Steel Corp., Niles, Ohio.

REELS AND SPOOLS—Shipping and Shop
Acrometal Products, Inc., Minneapolis, Minn.
American Pulley Company, Philadelphia, Pa.
Apco Mossberg Co., Attleboro, Mass.
Bridge Mfg. Co., The, Hazardville, Conn.
Clark, J. L., Mfg., Co., Rockford, Ill.
Hubbard Spool Co., Chicago, Ill.
Mason Can Company, Providence, R. I.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Niles Steel Products Div., Republic Steel Corp., Niles, Ohio.
North Anson Reel Co., North Anson, Maine.

REELS & SPOOLS—Wooden
Acrometal Products, Inc., Minneapolis, Minn.
American Woodworking Co., Chicago, Ill.
Bridge Mfg. Co., Inc., The, Hazardville, Conn.
Durkee Mfg. Co., Pine River, Minn.
Nelson Co., The, Baltimore, Md.
North Anson Reel Co., North Anson, Maine.

REELS—Metal Bound
Durkee Mfg. Co., Pine River, Minn.
Hubbard Spool Co., Chicago, Ill.
North Anson Reel Co., North Anson, Maine.

REELS—Takeoff
Acrometal Products, Inc., Minneapolis, Minn.
American Pulley Company, Philadelphia, Pa.
Apco Mossberg Co., Attleboro, Mass.
Bridge Mfg. Co., The, Hazardville, Conn.
Clark, J. L. Mfg. Co., Rockford, Ill.
Hubbard Spool Company, Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass
Niles Steel Products Div., Republic Steel Corp., Niles, Ohio.
North Anson Reel Co., North Anson, Maine.

REELS—Vulcanizing & Impregnating
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Company, Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Niles Steel Products Div., Republic Steel Corp., Niles, Ohio.

REELS—Wire Drawing
Acrometal Products, Inc., Minneapolis, Minn.
American Pulley Company, Philadelphia, Pa.
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Company, Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Niles Steel Products Div., Republic Steel Corp., Niles, Ohio.

REELS—Wire Mill
Acrometal Products, Inc., Minneapolis, Minn.
American Pulley Company, Philadelphia, Pa.

WHERE TO BUY, Continued

Apco Mossberg Co., Attleboro, Mass.
Bridge Mfg., Co., The, Hazardville, Conn.
Durkee Mfg. Co., Pine River, Minn.
Hubbard Spool Company, Chicago, Ill.
Mason Can Company, Providence, R. I.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Niles Steel Products Div., Republic Steel Corp., Niles, Ohio.
North Anson Reel Co., North Anson, Maine.

REFRACTORIES—High Temperature
Norton Company, Worcester, Mass.

RESISTANCE HEATING—Annealing Patenting, Etc.
Trauwood Engr. Co., Cleveland, Ohio.

ROD BAKERS—
(See Ovens—Rod Bakers)

RODS—Aluminum
Aluminum Co. of America, Pittsburgh, Pa.

RODS—Nickel Alloy
International Nickel Co., Inc., New York, N.Y.

RODS—Stainless Steel
American Steel & Wire Co., Cleveland, Ohio.

RODS—Wire—Non-Ferrous
Platt Bros. & Co., The, Waterbury, Conn.

RODS—Wire, Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Indiana.
Keystone Steel & Wire Co., Peoria, Ill.
Roebling's John A., Sons Co., Trenton, N. J.
Youngstown Sheet & Tube Co., Youngstown, O.

ROPE—Wire
American Steel & Wire Company, Cleveland, Chicago, New York.
Bethlehem Steel Co., Bethlehem, Pa.
Columbia Steel Co., San Francisco, Calif.
Roebling's John A., Sons Co., Trenton, N. J.
U. S. Steel Export Co., New York, N. Y.

RUBBER AND RUBBER COMPRESSION TESTERS—
Scott Testers, Inc., Providence, R. I.

RUST PROOF COMPOUNDS—
(See Compounds—Rust Preventing)

RUST REMOVING COMPOUNDS—
(See Compounds—Rust Preventing)

SALTS—Heat Treating, Descaling, etc.
Holden, A. F., Company, The, New Haven, Conn. and Detroit, Mich.
Houghton, E. F. & Co., Philadelphia, Pa.

SATURATION SYSTEMS—
Industrial Ovens, Inc., Cleveland, Ohio.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y Inc., Pawtucket, R. I.

SOAPS—Industrial and Wire Drawing
(See Compounds—Wire Drawing)

SOLVENT RESIN SYSTEMS—Experimental
Industrial Ovens, Inc., Cleveland, Ohio.

STAMPINGS—Steel
Hubbard Spool Company, Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.

STRIP—Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Roebling's, John A., Sons Co., Trenton, N. J.
Youngstown Sheet & Tube Co., Youngstown, O.

SWIFTS—Take-off
Apco Mossberg Co., Attleboro, Mass.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Watson Machine Co., Paterson, N. J.

TANKS—Compound
Haveg Corp., Newark, Del.
Watson Machine Co., Paterson, N. J.

TANKS—Pickling
Chemsteel Construction Co., Pittsburgh, Pa.
Haveg Corp., Newark, Del.

TANKS—Steel
Chemsteel Construction Co., Pittsburgh, Pa.
Mossberg Pressed Steel Corp., Attleboro, Mass.

TINSEL—Cords, Decorative
(See: Tinsel—Electric Conductor)

TINSEL—Electric Conductor
Montgomery Co., The, Windsor Locks, Conn.

TINSEL—Electric Resistance
(See: Tinsel—Electric Conductor)

TINSEL—Lame, Silver and False Gold
(See: Tinsel—Electric Conductor)

TINSEL—Thread, Silver and False Gold
(See: Tinsel—Electric Conductor)

TINSEL—Thread, Decorative
(See: Tinsel—Electric Conductor)

TINSEL—Wire
(See: Tinsel—Electric Conductor)

TOOLS—Wire Cutting
Porter, H. K., Inc., Everett, Mass.

TRAMRAIL SYSTEMS—
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.

TRAVERSES—For Reels
Entwistle, James L. Co., Pawtucket, R. I.
Hubbard Spool Company, Chicago, Ill.
Niles Steel Products Div., Republic Steel Corp., Niles, Ohio.

TRAVERSE MECHANISMS—
Apco Mossberg Co., Attleboro, Mass.
Mossberg Pressed Steel Corp., Attleboro, Mass.
New England Butt Co., Providence, R. I.
Niles Steel Products Div., Republic Steel Corp., Niles, Ohio.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y Inc., Pawtucket, R. I.

TUBE BENDERS AND FORMERS—
H. D. Kilmer Co., Cleveland, Ohio.
Ruesch, H. J., Machine Co., Newark, N. J.

VALVES & FITTINGS—Acid Resistant
Haveg Corp., Newark, Del.

VARNISHES—For Insulation
Standard Varnish Works, Staten Island, N. Y.

VULCANIZERS—
Watson Machine Co., Paterson, N. J.

VULCANIZING PANS—
American Insulating Mach'y Co., Phila., Pa.
Mossberg Pressed Steel Corp., Attleboro, Mass.

WELDERS—Spot and Butt
Eisler Engineering Co., Newark, N. J.
Micro Products Co., Chicago, Ill.

WIND-UP AND UNWIND SYSTEMS—Continuous
American Insulating Mach'y Co., Phila., Pa.
Davis R. L. Electric Co., Wallingford, Conn.
Entwistle, James L., Co., Pawtucket, R. I.
Industrial Ovens, Inc., Cleveland, Ohio.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc., Pawtucket, R. I.

WIRE—Aluminum
Aluminum Co. of America, Pittsburgh, Pa.
Elmet Division, North American Philips Company, Inc., Lewistown, Maine.
Malin & Co., Cleveland, Ohio.

WIRE—Barbed
Interlocking Fence Co., Morton, Ill.

WIRE—Cast
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Cold Heading
American Steel & Wire Co., Cleveland-Chicago, New York.
Bethlehem Steel Co., Bethlehem, Pa.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Keystone Steel & Wire Co., Peoria, Ill.
Roebling's, John A., Sons Co., Trenton, N. J.
Timmerbiel, E., Greenwich, Conn.
U. S. Steel Export Co., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Electric
Malin & Co., Cleveland, Ohio.

WIRE—Flat, Fine
Elmet Division, North American Philips Company, Inc., Lewistown, Maine.
Montgomery Co., The, Windsor Locks, Conn.

WIRE—Manufacturers
American Steel & Wire Co., Cleveland-Chicago, New York.
Bethlehem Steel Co., Bethlehem, Pa.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Keystone Steel & Wire Co., Peoria, Ill.
Roebling's, John A., Sons Co., Trenton, N. J.
Tennessee Coal, Iron & R. R. Co., Birmingham, Ala.
Timmerbiel, E., Greenwich, Conn.
U. S. Steel Export Co., New York, N. Y.
Wickwire Brothers, Inc., Cortland, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Music
American Steel & Wire Co., Cleveland-Chicago, New York.
Columbia Steel Co., San Francisco, Calif.
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Malin & Co., Cleveland, Ohio.
Timmerbiel, E., Greenwich, Conn.
U. S. Steel Export Co., New York, N. Y.

WIRE—Nickel & Nickel Alloy
International Nickel Co., Inc., New York, N. Y.

WIRE—Nickel Silver and Phosphor Bronze
Malin & Co., Cleveland, Ohio.

WIRE—Spring
American Steel & Wire Co., Cleveland-Chicago, New York.
Bethlehem Steel Co., Bethlehem, Pa.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Keystone Steel & Wire Co., Peoria, Ill.
Timmerbiel, E., Greenwich, Conn.
U. S. Steel Export Co., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Stainless Steel
American Steel & Wire Co., Cleveland-Chicago, New York.
Columbia Steel Co., San Francisco, Calif.
Firth Sterling Steel & Carbide Co., McKeesport, Pa.
Tennessee Coal, Iron & R. R. Co., Birmingham, Ala.
U. S. Steel Export Co., New York, N. Y.

WIRE—Steel—Also Coppered Steel—Also Galvanized Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Keystone Steel & Wire Co., Peoria, Ill.
Timmerbiel, E., Greenwich, Conn.
U. S. Steel Export Co., New York, N. Y.
Wickwire Brothers, Inc., Cortland, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Straightening and Cutting
Pittsburgh Cut Wire Co., Pittsburgh, Pa.
Wickwire Brothers, Inc., Cortland, N. Y.

WIRE—Zinc
Platt Bros. & Co., The, Waterbury, Conn.

WIRE CLOTH—Industrial
Roebling's, John A., Sons Co., Trenton, N. J.
Wickwire Brothers, Inc., Cortland, N. Y.

WRAPPING PAPER—Creped
Angier Corporation, The, Framingham, Mass.
Crepe-Kraft Company, The, Division National Waterproof Papers, Inc., Newark, N. J.

YARNS & TAPES—
Belding, Heminway, Corticelli Co., New York, N. Y.
Glass Fibers, Inc., Waterville, Ohio.
Owens Corning Fiberglas Corp., Toledo, Ohio.
Twitchell, E. W., Philadelphia, Pa.

YARN TESTERS—
Scott Testers, Inc., Providence, R. I.

The WATSON MACHINE COMPANY

ESTABLISHED 1845

PATERSON 3, NEW JERSEY, U. S. A.

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ELECTRICAL WIRE AND CABLE, WIRE ROPE AND CORDAGE MACHINERY

PLANETARY STRANDERS: Three types, many sizes, for all duties, geared or ring backturn, main rotor shaft or roller support. "Shaftless" cradles.

RIGID FRAME STRANDERS "RH." Horizontal, overhung spindle designs. Ball bearing main rotor shaft support, no support rollers.

TUBULAR STRANDERS "TH." High speed type in all sizes. Patented Boat cradles and Tungsten Carbide guide system. Rotor spool and lay head electric stops.

BUNCHERS "V." High speed, double twist, vertical designs. Minimum floor space and operating expense. Heavy duty horizontal types.

CABLERS. Planetary and high speed "HH" designs.

WATSON

CLOSERS. Planetary and high speed types for wire rope.

ARMORING MACHINES. Complete with planetary wire or metal tape heads.

JUTERS. 36 or 48 cop and to 6-inch cable passage.

SERVING HEADS. Concentric and eccentric, many designs, for threads, asbestos, etc.

TAPING HEADS. Many types and sizes. For metallic and non-metallic tapes. Eccentric, single and double-concentric. Patented uniform torque tape brake.

COMPOUND AND SATURATING TANKS. Many types and sizes.

CHALK, MICA AND OTHER POWDER APPLIERS. "Wet" and "Dry" types in a variety of designs and sizes.

CAPSTAN SECTIONS. Single tapered wheels to 10 foot dia. and double grooved types to 80 inch dia. for heaviest duty and highest haul pulls. Many sizes and designs.

LET-OFFS. Manual, mechanical, hydraulic and electric motor lift types and "Shaftless" designs to 120-inch 30-ton sizes.

GANG SPOOLERS. Table and Floor types in many sizes and designs.

REWINDERS AND COILERS. All motorized, for warehouse and shipping use.

CAPSTAN TAKEUPS. Single and in multiples.

CONTINUOUS TAKEUPS. Double reel designs, constant tension, wide speed range to cover all Continuous Vulcanizing and Plastic Extruding takeup requirements.

HEAVY DUTY TAKEUPS. "Shaftless" in many designs and sizes to 120"-50-ton. Mechanical lift, hydraulic lift, motorized lift, incline frame and other types. Line shaft, electric and hydraulic drives. Foot treadle, electric switch, pneumatic, hydraulic and mechanical controls.

TAKEUP TRANSMISSIONS. Heavy Duty, Type "D." Combines two-speed transmission, manual slack-takeup drive and multiple-disc-in-oil friction mechanism in one compact unit. Now available in three sizes.

AUTOMATIC TRAVERSES. Many sizes and arrangements. Wide lay range. Designs cover range from fine wire to 6" cable and wire rope. Fully automatic and disconnectible for manual operation. Suitable and widely used for replacement of inadequate mechanisms on older takeups.

VULCANIZERS. Cavity and Plate "Patch" units. Mechanically or pneumatically operated. Available with or without dies.

POLISHERS. Power driven, centrifugal and spring-pressure types.

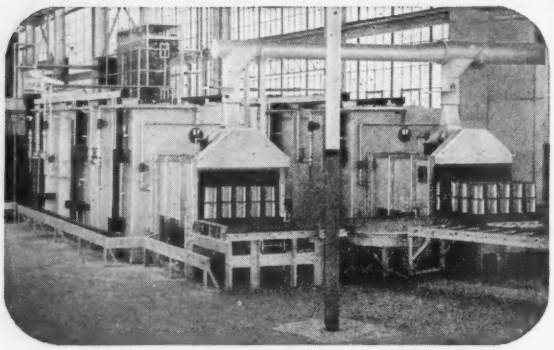
TESTING MACHINES. Impact, Torsion, Bend and Endurance types.

MEASURING MACHINES. For linear measurement. Offered in a variety of sizes and arrangements.

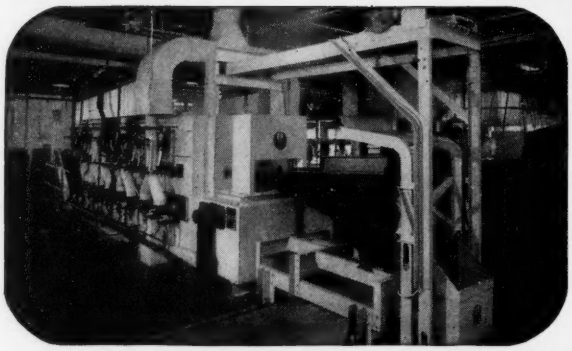
REEL CRUTCHES. For turning very large and heavy reels. Widely used in warehouses, shipping rooms, by railroads, steamship lines and wherever reel handling is a problem. Available from stock.

REELS AND SPOOLS. Cast Steel and Fabricated designs for extremely heavy planetary and shipping use.

CABLE PLANT AND WIRE ROPE MILL EQUIPMENT. All manners of special and miscellaneous designs for general and special purpose work too numerous for listing but on which inquiries are invited.



Bright annealing wire. EF gas-fired and electric furnaces are built in many sizes and types for bright annealing wire on spools or reels, in coils or strands—ferrous and non-ferrous, including stainless.

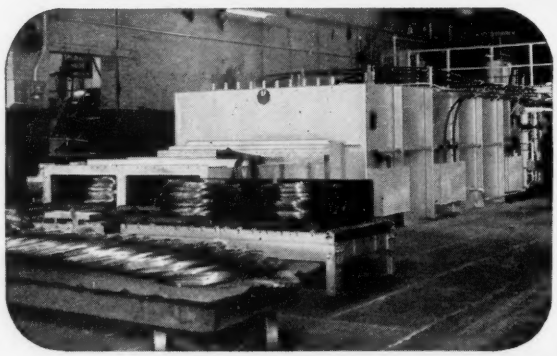


Bolts, springs and other products are scale-free heat treated in EF continuous chain belt conveyor furnaces similar to the above. 11 sizes—to handle from 125 to 2000 lbs. or more per hour. Hundreds are in operation.

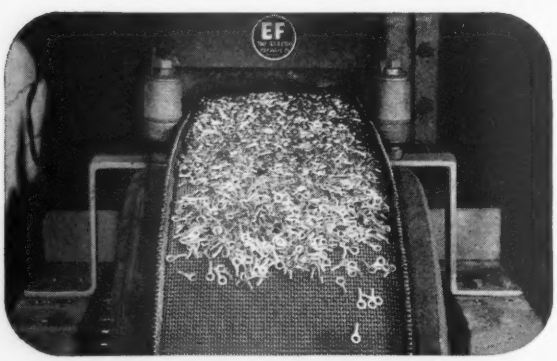
There's an EF

high efficiency production furnace

FOR EVERY annealing, heating or heat treating REQUIREMENT



An EF continuous bright annealing furnace in which the wire is conveyed through the various zones on two parallel rows of bulkhead-type trays. This unit has convection cooling and handles 2500 net lbs. of wire per hour.



EF woven wire mesh belt conveyor furnaces are available in various widths—for a wide variety of products—for drawing, annealing, sintering, brazing and other heating processes—at temperatures up to 2100° F.

• For heating wire bars and billets—process annealing or normalizing—bright annealing ferrous, non-ferrous, stainless or other alloy wire—in coils or strands—on reels or spools—also for carbon restoration and non-decarb heat treating bolts and other rod or wire products—bluing, or any other heat treating process—investigate EF developments.

Our long experience—and complete line of batch and continuous furnaces featuring the many advantages available only in EF design—assures efficient operation, uniformity of finished product and satisfactory performance. Sizes to meet any capacity requirement.

Gas-Fired, Oil-Fired EF and Electric Furnaces

for any Process, Product or Production

THE ELECTRIC FURNACE CO.

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